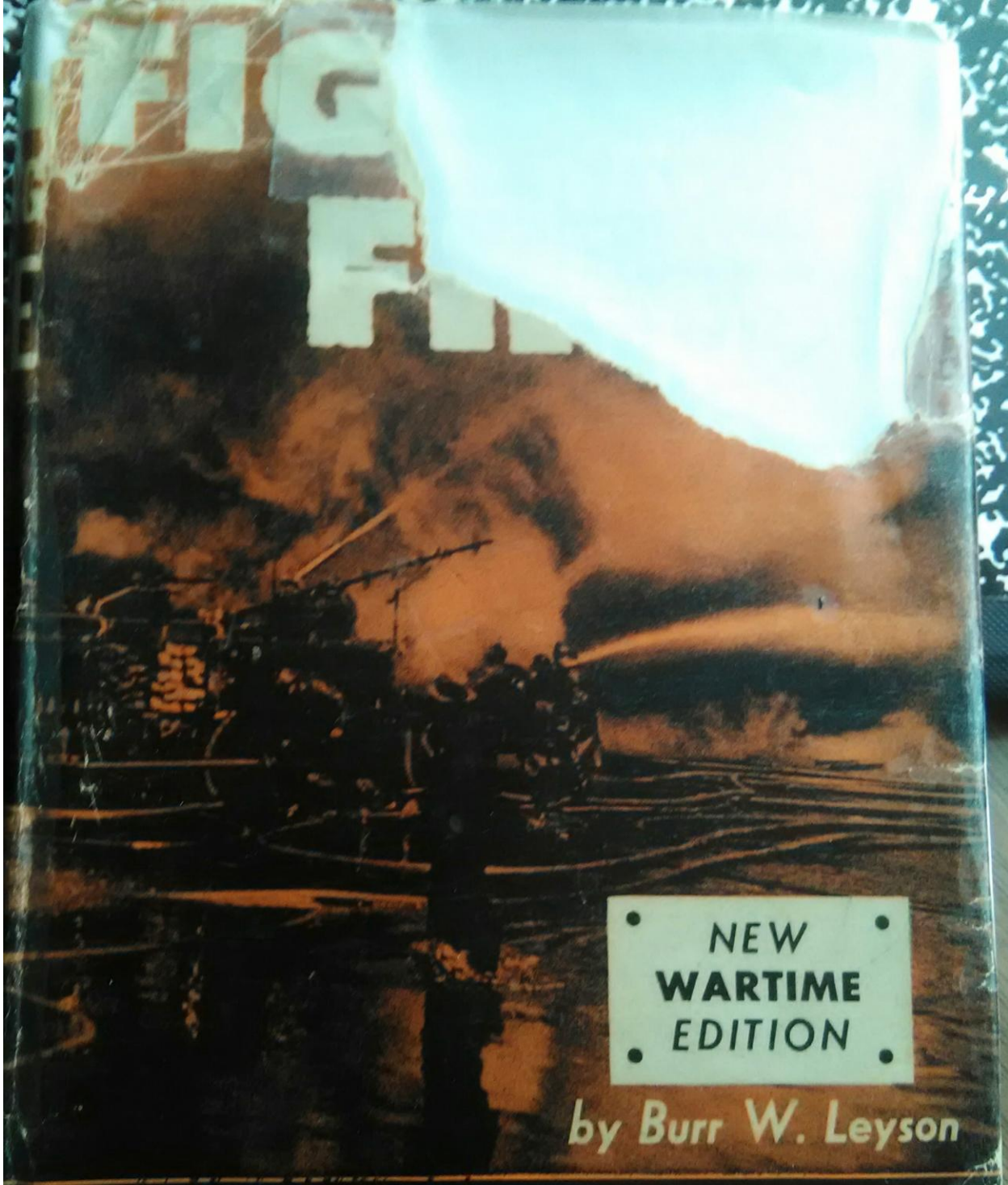

NEW
WARTIME
EDITION

by Burr W. Leyson

With an Introduction by

JOHN J. McELLIGOTT

Fire Chief and Commissioner, New York Fire Dept. (1934-1941)

FIGHTING FIRE

Including new, up-to-the-minute photographs and two new chapters: THE AUXILIARY FIREMAN *and* INCENDIARY AND EXPLOSIVE BOMBS.

By Captain Burr Leyson

Introduction by

Commissioner John J. McElligott

(1934-1941)

ACTION — THRILLS — COMPLETE AUTHENTICITY! These are the keynotes of this book. Captain Leyson had special permission from New York City's Fire Commissioner to enter every division of the Fire Department, live with the men, ride the apparatus to fires and watch all activities. For eight months he did nothing else. Numerous photographs throughout the book show the author in action as an amateur fireman!

The dominant note throughout the book is speed. The writing keeps pace with the work of the firemen. Forty seconds to erect the aerial ladder that saves the lives of three people trapped in a burning tenement; thirty seconds to raise the giant water tower and extend it to its full height; one minute for 900 gallons of water to come pounding out on a blaze — and more — many more — breathtaking tales of speed in fighting fire and saving lives.

Captain Leyson rode "pumpers", hook and ladder trucks, rescue trucks, water towers, fire boats and even rode in the chief's car on occasions. Wherever he went, he recorded the deeds of the firemen. And all the while he talked with the men, getting exciting stories of rescues and major fires. In this book he tells these thrilling stories that came directly from the men who helped to create them.

In discussing real fires, Captain Leyson describes the reaction of individuals when they wake in the middle of the night, smell smoke and suspect fire. In most cases they do all the wrong things and many lives are lost from ignorance of the correct procedure. Teachers will find useful material for classroom discussion in these chapters. Likewise, the book is directly in line with the present trend towards vocational guidance in high schools. It contains much valuable information, clearly presented and will be welcomed everywhere by teachers looking for readable non-fictional accounts of interesting occupations.

For sheer excitement this book will find considerable popularity among teen age boys. But there is nothing to limit it to boys. Adults interested in the work of the Fire Department will also find it informative and entertaining.

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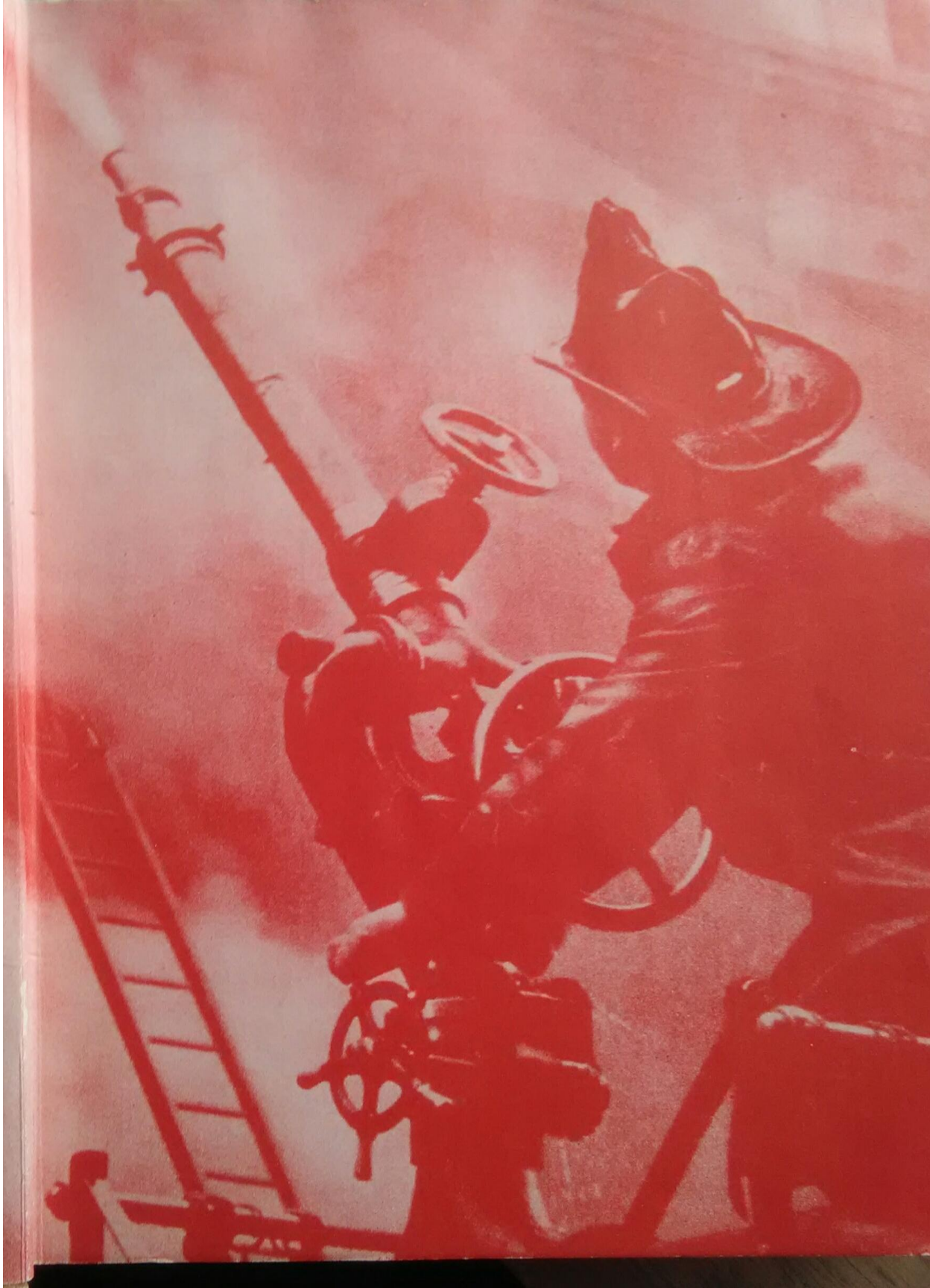

FIGHTING FIRE

Also by Captain Burr Leyson

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WINGS OF OFFENCE

THIS MAN LA GUARDIA
(Co-Author)

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FIGHTING FIRE
(World-Telegram Photo)

FIGHTING FIRE

By

CAPTAIN BURR LEYSON

NEW WARTIME EDITION

ILLUSTRATED

WITH A FOREWORD BY

Commissioner John J. McElligott

(1934–1941)

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The author wishes to acknowledge his gratitude to the Honorable John J. McElligott, Chief of the Uniformed Forces and Commissioner, Fire Department of the City of New York, for making it possible through his special permission to interview, live with and "roll" to fires with the various divisions of the New York City Fire Department.

To Mr. Richard Warner, Secretary to the Fire Department, for his invaluable advice and unfailing courtesy.

To the officers and men who gave so freely of their time in helping in the preparation of this book, the author's sincerest thanks.

To Milton Lefkowitz, photographer, for his expert technical advice in the selection of suitable photographic material and many of the illustrations in this volume.

PREFACE

In the pages of this book we live with firemen, we ride the apparatus when it roars through the streets to answer an alarm of fire. We follow firemen as they make thrilling and heroic rescues. We visit every important part of a great city's fire department.

We see firemen in action and action is the keynote of this book. From the time he was a boy the author had an ambition to go to fires with the firemen. For the last eight months he has done little else, and to say that he has enjoyed it is stating it all too mildly.

But enough of words—we want action and so—there goes the alarm! Start the siren! Clang that bell! Let's "roll"! We're going to fires!

CAPTAIN BURR LEYSON

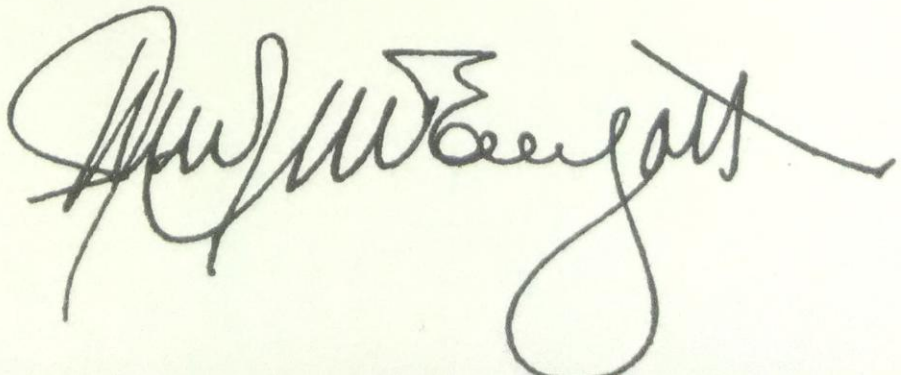
FOREWORD

by

The Honorable JOHN J. McELLIGOTT, Chief of the Uniformed Forces and Commissioner, Fire Department, City of New York, N. Y., 1934 to 1941.

As do the members of all Fire Departments throughout our country and the rest of the world, we of the Fire Department of the City of New York take pride in our record. Each year sees a greater saving of life and property through the activity of the Department. All of our efforts are directed to reducing this loss to an absolute minimum.

For the last eight months Captain Leyson has had access to every part of the Fire Department and has watched the members at their profession of fighting fire as well as preventing fire. In the following pages he gives you an *authentic and comprehensive* account of the activities of the Fire Department of the City of New York.



CONTENTS

PAGE

ACKNOWLEDGMENT 5

PREFACE 7

Foreword by the HONORABLE JOHN J. MC ELLIGOTT, Chief of the Uniformed Forces and Commissioner, Fire Department, City of New York, *1934 to 1941.* 15

CHAPTER

I. MODERN FIRE-FIGHTING 19
We watch Chief David J. Oliver in action and see how the alert modern fireman saves life and property.

II. THE ENGINE COMPANIES—THE "SMOKE-EATERS" 35
We "roll" to a fire with an engine company and help to extinguish the blaze—watch the men in action and then examine this great "pumper."

III. THE HOOK AND LADDER COMPANIES 53
We watch a Hook and Ladder Company in action—follow a thrilling rescue that actually happened—inspect the truck and learn what it carries and how each piece of apparatus is used.

IV. THE WATER TOWER—A PORTABLE NIAGARA 73
We watch a water tower in action at a great New York City fire. We examine the apparatus—learn how it is used—discover that it can discharge over four thousand gallons of water a minute, between sixteen and twenty tons of water every sixty seconds.

CONTENTS

CHAPTER PAGE

V. THE FIREBOATS 89

A sea of fire—the heroic fight of the Gaynor and her crew with a burning oil barge—the value of the fire boats—the great service that radio-telephone renders.

VI. THE FIREFIGHTER—WORLD'S MIGHTIEST FIREBOAT 101

We go to a fire aboard the *Firefighter*—see her in action—make a trip of inspection through this most interesting of vessels—learn its uses and the equipment she carries.

VII. FIREMEN IN THE MAKING — THE PROBATIONARY SCHOOL 123

We see a "rookie" fireman make a thrilling rescue—visit the school that has given him the training to make it possible—we climb the sides of buildings—jump into life nets—follow a probationary fireman as he receives his training.

VIII. THE FIRE DEPARTMENT AMBULANCE—A WHEELED HOSPITAL 147

We visit Doctor Archer, world-famous Fire Department surgeon and doctor—examine the unique ambulance he operates. We hear some of his thrilling experiences—watch him at a fire where over one thousand firemen are injured!

IX. THE RESCUE COMPANIES—"SPECIALISTS IN LIFE-SAVING" 171

We visit Rescue Company Number One—watch it in action—learn of its many duties and exciting deeds—examine the truck and the many interesting pieces of equipment it carries.

CONTENTS

CHAPTER PAGE

X. SEARCHLIGHT TRUCK NUMBER ONE—A PORTABLE POWERHOUSE! 183

A land fire company at a marine accident! We examine the newest and oddest piece of equipment in the Fire Department—see it in action—the Searchlight Truck.

XI. THE TELEGRAPH BUREAU—NERVE CENTER OF THE FIRE DEPARTMENT 191

We visit the central Telegraph Bureau where all the alarms of fire in Manhattan Island are transmitted. Inspect the workings of the Bureau and discover the incredible speed with which the alarms are handled and the apparatus responds.

XII. A JUNIOR FIRE PATROL—HOW YOU CAN HELP TO PROTECT NOT ONLY YOUR OWN HOME BUT THOSE OF OTHERS 207

We combine the experiences of different divisions of the Fire Department into practical protection for our own homes. We follow the course of a mythical fire in a home and learn lessons from it. We formulate certain fundamental rules of safety in the home.

XIII. THE HIGH-PRESSURE SYSTEM—WATER TO THE SKIES! 219

We watch a fire on the fortieth floor of a New York skyscraper and wonder how water is forced so high. We examine the high-pressure system that makes this possible—we see the splendid planning for safety that goes into modern fire-fighting.

CONTENTS

CHAPTER PAGE

XIV. THE AUXILIARY FIREMEN 227

The necessity of Auxiliary Forces—the limitations of the regular Fire Departments—a hypothetical but entirely possible situation if air attack comes. The essential role of the auxiliary—the plan of distribution of these forces—their work.

XV. FIRE BY AIR ATTACK 235

Fire—one of air attack's chief weapons—the methods of employing fire—the incendiary bomb—its construction—effects—explosive bombs—their construction—effects.

ILLUSTRATIONS

FIGHTING FIRE	*Frontispiece*
	FACING PAGE
"FIREMAN" LEYSON "LEAPS FOR LIFE"	24
NEXT STOP SIXTH FLOOR	25
A WATER TOWER IN ACTION	32
DECK PIPES ON A HOSE WAGON	33
A FIRE DEPARTMENT IN ACTION	48
A SMOKE EXPLOSION	49
AN AERIAL LADDER RESCUE	64
CHERRY ST. FIRE DEPARTMENT FIGHTING BLAZE	65
A SMALL FACTORY FIRE	80
INJURED FIREFIGHTERS	81
A SMOKE EJECTOR TRUCK	96
A FIREMAN LECTURES ON FIRE PREVENTION	97
THE "FIREFIGHTER"	112
OVER 20,000 GALLONS A MINUTE!	113
HORSES BY THE THOUSAND!	113
SWING IT!	Between Pages 120-121
ON TOP AND COMING IN!	Between Pages 120-121

ILLUSTRATIONS

	FACING PAGE
AN AERIAL LADDER IN POSITION	Between Pages 120-121
CLOSE-UP OF DECK PIPE IN ACTION	Between Pages 120-121
RESULTS OF A FALSE ALARM	144
INTERIOR OF A FIRE TELEGRAPH BUREAU	145
TO BUILD CONFIDENCE	160
HUMAN FLY! THE SCALING LADDER IN USE	160
TRAINING CENTER	161
"KICK OFF"	192
COMING OUT OF THE "SMOKE CELLAR"	193
BOWLINE ON A BIGHT! AND THE GROUND 100 FEET BELOW	208
ONE HUNDRED FEET ABOVE THE STREET	208
"FIREMAN" LEYSON CARRYING UP HOSE	209
AERIAL LADDERS IN POSITION	224
FIREMEN REPAIRING TOYS FOR POOR CHILDREN	225
FIREMEN OVERHAULING REMAINS OF FIRE	240
RESULTS OF AIR BOMBING	241

MODERN FIRE-FIGHTING

MODERN FIRE-FIGHTING

We Watch Chief David J. Oliver in Action and See How the Alert Modern Fireman Saves Life and Property.

THE hands of a clock, set high in the wall of a building near the corner of Lafayette and Walker Streets in Manhattan, marked close to the hour of noon. Below the clock scurried hundreds of citizens, passing to and fro in that ceaseless flow of hurrying pedestrian traffic that is so typical of New York.

The minute hand crept closer to the hour hand now all but resting over the 12 at the top of the huge dial. In a moment it would be noon, but that clock was never to mark the hour; in seconds it was to be destroyed.

There was little about that six-story loft building that distinguished it from countless others of the same general design that are a part of lower Manhattan. Its dull red brick walls were broken by innumerable narrow windows. A large cornice projected over the street and a glass top canopy extended from the main entrance of the building to the curb. It was a relic of the past when the building was "new and modern"

and housed offices. Long lines of horse-drawn carriages then drew up to the canopy to discharge their passengers. Now great trucks backed up to the building to discharge and load freight, for manufacturing firms had long since replaced the offices of the former period.

From deep within the building there came a muffled roar. It was not the usual sharp detonation of an explosion, rather it sounded more like the low roll of distant thunder or the rumble of a subway train passing underfoot. It caused slight interest in the hurrying throngs on the street. The noise passed all but unnoticed.

An instant later the windows of the fourth floor flew outward. Quicker than the eye could follow long tongues of yellow flame followed the hurtling glass. A terrific roar shattered the ears of those near by and the entire district rocked under the force of the explosion. The clock, set high in the wall of the building, sailed out into space and shattered to bits on the street below.

Flame gushed from every window of the fourth floor and dense clouds of acrid smoke poured out in oily clouds. The passers-by scattered wildly for shelter and from the building, piercing the dull rumble of the

flames, came the shrill shrieks of women, trapped on the upper floors.

The figure of a man appeared at a window. For a moment he crouched on the sill and then he clambered out, threw himself on his side and clung by one hand and a leg while the flames licked at his burning clothing. On another side of the building two painters, perched on a scaffold hung by ropes from the edge of the roof, gazed helplessly upward and watched the flames wrap around the long ropes that held their flimsy footing. They were at the lowest point to which they could lower the scaffold and there was no going back, for now the flames blocked the path. In short minutes the ropes would burn through and then would come the long plunge to the cement of the sidewalk.

Such was the situation. An entire floor involved in flame, two floors immediately above it filled with women factory workers, a man clinging to a window-sill perch and obviously going to drop in less than minutes and, on another side of the building, two painters trapped high above the street on their scaffold with the ropes already burning through!

Let us roll back Time and enter the quarters of Fire Chief David J. Oliver in Engine Company 31 which is located less than five hundred feet from the

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Let us roll back Time and enter the quarters of Fire Chief David J. Oliver in Engine Company 31 which is located less than five hundred feet from the

burning building. Let us follow Chief Oliver as he directs the fighting of this fire and the saving of life. In following him we can gain an insight into the working of the Fire Departments throughout our country and better understand and appreciate the science of this profession that results in such a saving of life and property.

Chief Oliver is sitting at his desk in the second story of the Fire House when the first blast of the explosion rattles the windows. His highly trained senses immediately identify it as an explosion, a serious one. No mere backfire of a truck or a manhole explosion this, but one that is certain to spell disaster. More, it is close at hand. With a bound he leaves the desk and springs into action. Even as he slides down the polished brass pipe to the lower floor he shouts the command to the men to "roll." The alarm rings and the company jump to their stations. Back roll the doors of the Fire House and out into the street they go, bell clanging and siren sounding. A quick glance shows them the fire.

Chief Oliver has not depended upon chance to locate the fire. He is far too good a fireman to do that. One does not gamble with lives and property. But—he is a typical modern fire-fighter—alert and intelli-

gent. As do all Chiefs, he knows his district. The instant he heard that thunderous roll of the explosion his mind worked with lightning rapidity.

The obvious force of the explosion eliminated minor possibilities. It was a disaster in some building. Then what building? Near by, for the report was not a distant one. The sound and the window-rattling force of the blast came as one. Explosive material stored near by. That meant the building at the northwest corner of Lafayette and Walker Streets. Fourth floor—large stocks of celluloid—cases of it—stored there. One glance as they rolled out of the Fire House confirmed his judgment.

As the engine roars to the scene, Oliver stiffens in his seat. He sees that man hanging on the edge of the window sill, sees the flames curling around his hand and leg and knows that it is but a matter of a minute or so until the man will be driven from his perch and crash to the street below.

"Life net!" he roars, and points up at that fourth-story window. "Get the net under that man!"

The engine is at the corner now and Oliver barks another order.

"Send in a second alarm! And a call for ambulances!" he shouts to his assistant. The second alarm

and the call for medical aid goes in before the apparatus arrives at the fire! It is the fastest second alarm in the Department's history.

The company are now in front of the building. The fastenings of the life net have been loosened and as the truck grinds to a stop the firemen leap to the street with the net and quickly spread it under the point where the man is clinging to the window. They are not a moment too soon.

A burst of flame, shooting halfway across the street, fills the window and it is humanly impossible to cling there longer in face of the heat. The man gives a wild cry and, loosening his hold, drops like a stone from the window. His fall is the signal for a horror-stricken cry from the crowd. Down plummets the body.

The falling body strikes the glass canopy over the sidewalk, smashes through it as though it were paper and then plumps into the life net. The men holding the net jerk with the force of the blow but their grip is not broken. Gently they lower the body to the sidewalk. Then a strange thing happens and turns what appeared to be tragedy into comedy, if comedy can exist at so grim a scene. The man slowly sits up and is helped to his feet. He feels his body, his legs, runs

"Fireman" Leyson "Leaps for Life." (Milton Photos)

The author showing the proper manner of climbing a scaling ladder. The cross pieces are only for the feet, the hands grasp the single upright beam. Note how closely it hangs to the wall. (Milton Photos)

his hands along his arms and then feels his head. He is all there, intact. He can hardly believe it but it is so. Then he looks around at the circle of anxious faces. His whole expression changes. Horror and the fear of the trapped mark his features. With a quick dive he breaks through the ring of men and runs wildly up the street as though all of the fiends of the nethermost regions were pursuing him! When the fire is over and we enter the building to examine the ruins we shall learn why he has fled.

Not over a minute and thirty seconds have passed since the firemen arrived. Oliver waves an arm, shouts:

"Get three lines in that doorway! Three more in the other! Get them up onto that fourth floor! Hold the stairways!"

Thanks to his knowledge of the building, Oliver knows that there is a chance of holding open the escape of those women on the fifth and sixth floors. He turns his attention to the two men suspended on the scaffolding hung on the far side of the building.

The ropes are smoldering from the heat and flame and the scaffold is due to drop in a short time if nothing is done. No aerial ladder can reach the men, for another low building adjoins the burning loft. The

height is too much for the thirty-five-foot portable ladders to span.

"Water tower!" commands Oliver. A long water-tower truck rolls around the corner and takes its station beside him.

"Play a stream on that wall! Give them a water curtain and keep those ropes from burning through until we can get them out of there somehow!"

Up goes the great tower as lines are coupled from a near-by pumper. The monitor nozzle at the peak of the mast rises and then a stream of water shoots forth. It springs across the gap and strikes the wall, splatters along its length and sends down a drenching spray. The falling water wets the ropes holding the scaffold, cools the hot wall and refreshes the two men crouched on the platform.

The firemen from a hook and ladder company are swarming up onto the burning building. Others appear on the low roof of the adjoining building and scale the wall. Soon men are in a position to begin the rescue of the trapped painters on the scaffold. It is a difficult feat. Ladders cannot reach them and they cannot be lowered or raised. The flames stop any attempt to bring them up and the ropes are at their limit so they cannot be lowered.

A fireman appears at a window. In his hand is a large iron hook and a length of rope is attached to it. He gauges the distance to the scaffold and makes a cast. Short! The crowd groans. Again he casts and one of the men on the scaffold grasps the rope.

The fireman signals and the hook is fastened to the scaffold. The line becomes taut as the fireman pulls the rope. Other firemen join him and now the scaffold rubs along the wall, being pulled nearer the window. The ropes above are at a sharp angle, drawn across the face of the burning building to the window in which the firemen are standing. Now the platform is at a window and the men clamber to safety. The rope is dropped and the scaffold swings back as the firemen turn their attention to the burning building.

Chief Oliver dashes back to the front of the building. What of those women on the fifth and sixth floors? Their exit has been cut off by the flames—or has it? He has sent men up there. They should be there by now. Only minutes have passed, for the firemen have worked at lightning speed to effect this rescue.

Oliver darts into the entrance and up the stairs. He no sooner enters the doorway than he is met by a stream of excited women running down the stairs. He

sighs with relief and shakes his head. "Thank God for that! They're getting out safely." He reaches the fourth floor.

Men crouch on the stairs playing streams of water up the flight to the fifth floor. Others direct a stream on the fireproof doors that open into the floor where the fire rages. The walls are blistering hot and smoke and gas fills the air. The women, directed by firemen above, slide and clamber down through a torrent of water that protects them from the fury of the fire. It is touch and go. Those walls are not going to hold much longer. Then the last woman is sent down the stairway and "All clear" is reported from above. Plaster flakes from the walls and tongues of flame lick through the cracks. The walls give to the fire and the stairs are impassable! But the women are safe. Oliver turns to the fire.

Now he can devote all of his attention to fighting the blaze. His first duty is done. He has made sure that all lives endangered are safe. He has taken measures to check the fire and keep the escapes clear until the people in the building are out. That is the first duty of a fireman. Now, after life, comes the saving of property.

Oliver is coughing and gagging from the smoke and

fumes. The men crouched there beside him suffer the same.

"Watch it!" he cautions them. "Celluloid in there and the fumes are bad! Don't get too much! Keep low!"

He runs back down the stairs and directs the water tower to the front of the building. Soon its great stream of one thousand two hundred gallons a minute is crashing through the openings and sweeping the floors. The stream is brought higher until it tears at the burning ceiling and sends a shower of debris and water cascading along the entire length of the flaming floor. Other streams add to the volume.

Firemen are blindly fighting their way along the floor of the fifth story and chopping holes in the hot boards. Nozzles are thrust through the holes and more water floods the fire. But the fire drives back the men. The fifth floor is now involved in the flames. Yet the fourth-floor fire is slowly lessening. The water is beginning to show its effects.

Streams play onto the fire from all sides. The huge black clouds of smoke gray, whiten. Finally the smoke is but a light blue and small in volume. The firemen are fighting their way farther and farther into the building. Then the last of the fire is out except for

the glowing embers in odd corners and under heaps of debris.

Now Oliver begins an investigation of the fire. The Fire Marshal will make a complete inspection of the entire building, but the Chief in charge at the fire must also make a report. What started it?

The company occupying the floor manufactures articles that use celluloid. This celluloid is shipped to the firm in large boxes. Fire-prevention laws require that it be enclosed in a fireproof material when stored or shipped. Indirectly this fireproof material has been the cause of the fire and it brings us back to the peculiar incident of the rescued man leaping to his feet and running as though his life depended upon it!

The cases of celluloid are lined with tin which is soldered in tight joints. The man concerned had opened a case of the celluloid sheets to examine them. Satisfied, he sought to close the case. He took a soldering iron and attempted to solder the tin where he had cut it to examine the contents. But—and a big but—he was no expert and he had the iron red-hot. The tip of the iron touched the celluloid and that was all that was needed to start the fire. There was a flash of flame and then the whole floor was on fire as the flames leaped from one mass of celluloid to another.

MODERN FIRE-FIGHTING

Thanks to the quick action of Chief Oliver, and his expert handling of the situation, there was not a single life lost in this fire which might have resulted in catastrophe. It was a fine example of modern scientific fire-fighting as practiced by the Fire Departments throughout our country.

The watertower hurls thousands of gallons of water per minute into the upper floors of a burning warehouse. (Courtesy of Fire College, N.Y.F.D.)

Deck pipes on a hose wagon fighting a factory fire. (Courtesy Fire College, N.Y.F.D.)

THE ENGINE COMPANIES—THE "SMOKE-EATERS"

THE ENGINE COMPANIES—THE "SMOKE-EATERS"

We "Roll" to a Fire With An Engine Company and Help to Extinguish the Blaze—Watch the Men in Action and Then Examine This Great "Pumper."

IN THE quarters of the Engine Company all is quiet. Beside the great doors sits the man on desk duty, a shaded light glowing softly down on his work—the filling out of routine departmental forms. Behind him looms the great bulk of the Engine truck, the "Pumper." Its bright red paint and highly polished brass gleam in the overhead lights. Two men are at work on the rear of the Pumper, tracing a short circuit in the wiring of one of the spotlights. From time to time there is a loud buzzing as the automatic cut-out on the electrical system chatters when a short circuit exists.

"Here it is!" one announces as he bares a frayed section of wire. Methodically and thoroughly the two men set about repairing the break.

Suddenly a bell shatters the quiet with evenly spaced strokes. Swiftly it tolls out its signal—a mes-

sage of fire. The desk man raises his head, listens attentively. The two men on the end of the Pumper stop their work and listen.

The first number struck by the bell is a part of one to which the company responds. Another follows it. Now two numbers of an alarm to which they answer have been spelled off. The bell begins the third. "Clang . . . clang . . . clang!"

There is a brief pause and then the bell begins the signal again, tolling off the same numbers so that there can be no mistake. But in that brief interval the quiet of the Engine Company quarters is no more. Men suddenly appear as though by magic through the circular openings in the ceiling. They come hurtling down the bright brass pipes and check their fall at the base by sharply braking on the pipe with their arms and legs. Their feet strike the deep rubber pads and then they dash to their positions on the truck.

The driver clambers into the seat. There is a clash of gears as the starter spins, a whine and then the deep powerful bark of the engine as it catches and fires. It springs into a roar, abruptly subsides to a growl as the driver idles the throttle. The crew, sliding into their coats and helmets, clamber aboard. Electric motors roll back the great doors, the warning

bell on the truck sounds and the siren howls as the Engine Company swings out of the building on their roaring Pumper. The company is "rolling"—responding to an alarm.

The Pumper swings into the street, its siren wails a warning to traffic at the intersection ahead and then as the engine roars, the truck picks up speed and begins its run.

Cars cluster behind a streetcar that has stopped to let passengers alight. The roadway on the right is blocked. The siren shrieks and the shrill whistle on the engine exhaust pierces the air. The Pumper swings her nose to the left of the streetcar, over onto the wrong side of the street, slows down and rambles past the obstacle. Upon the driver rests a great responsibility. He must not delay, he is forced to make all the speed possible, for lives may depend upon the Pumper arriving at the fire promptly. Yet at the same time the driver must regard the safety of others on the streets. Although the Department has the right of way and demands it, it never does so in such a manner as to endanger the lives of the citizens.

Blocks pass, street after street is crossed and left behind. People stop, turn and watch the Pumper as it speeds along to battle. It rounds a corner and ahead is

the fire. Smoke and flame gush from an old tenement building. The Pumper swings down the street and heads for a hydrant. It draws close to the curb, grinds to a stop and as it does so the crew again spring into action.

One man opens the outlet of the hydrant and places a wrench on the valve stem at the hydrant's top. Others grasp the huge intake pipes and couple the hydrant with the Pumper so that the water will flow into the engine truck. The valve on the hydrant is opened and the connection stiffens under the hydrant's water pressure. The Pumper is ready to go into action.

Close on the heels of the Pumper during the run to the fire has been another and somewhat similar truck. This is the hose truck, an auxiliary to the Pumper. As the Pumper draws abreast of the hydrant the hose truck rumbles past. Men drop from the platform on the tail of the truck and drag a length of hose with them as they go. The truck roars on towards the fire. The men who have dropped from the truck dart to the hydrant and snub the hose around its body. As the truck speeds on, length after length of coupled hose is snaked from its body and strung along the street to the fire with incredible rapidity. Opposite the

fire the hose truck stops, extra length of hose are manhandled from the body of the truck by the crew and then the connecton is broken and a nozzle screwed in place.

Now the action speeds. An officer has examined the fire, determined its heart and source from long experience and directs his men into the building. The hose-truck crew are joined by men from the Pumper. The line of hose is dragged into the building as the remainder of the crew set about stringing other lines.

Led by a lieutenant in a white officer's helmet, the crew drag the line into the entrance of the building, disappear into the smoke and force their way along the corridor until they reach the basement stairway. Here dense smoke greets them but does not stop them. Down they go, coughing and gagging, "eating smoke."

In the basement they feel the heat of the fire. They drop to their knees and creep along the floor with their hose. The pall of smoke lightens in color and then they see the ruddy glow of fire ahead. The hose is charged with water, now no longer flat and flexible but stiff with the pressure from the powerful Pumper in the street. Fire is ahead—they can see it. Now, and now only, can they open the nozzle and play the

stream of water on the fire. (It is a Departmental rule that water cannot be used until the actual fire can be seen, except when conditions are such that water must be used to allow the men to force their way in to where the fire is located.)

The men crouch on the floor and the handle controlling the valve in the nozzle is slowly opened. Water gushes out, springs in a solid stream ahead and the pressure of the nozzle strains the men's arms. The stream hits into the glow of the fire, hisses and turns to steam. Up comes the stream until it strikes the ceiling. It is directed away from the fire!

The water strikes the ceiling and sends a drenching shower over the room. It cools the ceiling, lowers the temperature of the air and gases and then falls upon the contents of the room, soaking them, slowing the fire.

Its effect is soon felt by the men on the floor. The heat that has beat upon them lessens. They crawl nearer the flames, edging forward into the heat again. Still the stream is held above on the ceiling. Now they peer around the corner of a huge packing case and ahead they can see solid sheets of fire. Down comes the stream and into the flame it shoots. They hold it at the base of the flames. The bright yellow darkens to

red. A section of the fire dims. The hose swings, the stream attacks another section. Then it lifts, cools the ceiling again, sprays the room. Back it comes to the flames, methodically working and checking their fury. And all the while the men at the nozzle cough and struggle for breath as do the men strung out along the hose to help move it as the crew advance against the fire.

Suddenly the flames roll forward! They reach hungrily at the men who cower down on the floor, their helmets protecting their faces. But the stream plays on into the fire, held steady by the men at the nozzle. Then, as quickly as it advanced, the fire retreats. Other firemen, working on the building, have opened up the roof, broken in the glass covers of light wells and even chopped holes over air shafts. Ventilation comes into effect. A draft draws the flames upward where they follow the heated air ascending the shafts. Now the men crawl forward, attack the fire at its base, rapidly make headway in overcoming it. The smoke that has choked them, thins; the gases, hot and bitter in their throats, clear. They begin to be able to work unhampered except for a pall of smoke which would make the layman cringe but to them is nothing at all.

But while this crew from the Pumper has been

busily engaged in fighting the fire in the basement of the building the rest of the firemen have not been standing idly by. A combined crew from the hose truck and the Pumper have strung other lines to the fire. The aerial trucks have placed ladders in position for them to climb aloft and battle the blaze in the top stories. Let us watch them at their work of saving the building. For the moment we will disregard the inhabitants of the building, for they are not a direct concern of the Engine Company. This statement may seem peculiar but it is not. The Engine Company is directly concerned with getting water on the fire at the first possible moment, to check its advance and so make possible the saving of people in the building. The tenants and their safety are the concern of the aerial companies—the hook and ladder trucks—although in an emergency the men of a Pumper will spring to assist and save people. Quite naturally the first concern of all firemen is the saving of life but it must not be forgotten that this is often accomplished best by each of the highly trained units doing its assigned duty and not interfering with the performance of the others.

But, leaving our crew in the basement still battling the flames, let us go to the street and follow the men

of the engine company and the hose truck. Additional lines are strung from the Pumper to the fire. A fireman grasps the nozzle of a hose, swings it up over his right shoulder so that the limp line hangs down his back and the tip of the nozzle rests against his hip. The line crosses over the front of his body and rests against his left thigh. Then he grasps the sides of the aerial ladder that a hook and ladder company has placed beside the building. Up he goes, dragging the line after him.

Other firemen, spaced twenty feet apart so that there will be no excess weight on the ladder, grasp the line and help carry it aloft. They pass the first floor with the windows intact. The second-floor windows are opened and wisps of smoke filter from their tops. At the third floor solid columns of smoke pour out but the men climb on and disappear for a moment in the blinding vapor. At the fourth floor there is fire. Here they stop.

The fire is far back. The leading fireman places the nozzle of the hose over a rung of the ladder and makes the hose secure with a short length of line he carries on his belt. Then he grasps the nozzle above him, points it through the rungs and braces himself as he signals for water. The line rounds, swells, spurts

water from the orifice of the nozzle and another stream plays into the fire.

The interior of the room is tinder-dry. The furnishings feed the flames which race through its length. They reach the window and lick upwards. The heat is so intense that the fireman directing the stream is forced backward and down. For a moment it looks as though the fire will run wild.

An officer in the street looks up and then bellows an order. In seconds, other streams are directed at the window. Water beats in upon the flames, dims their fury, drives them back. More water hurls into the opening. Now only clouds of smoke pour out. The fireman on the ladder renews his attack, climbs back the few rungs he has retreated. Again his stream beats into the opening. The others below him grip the hose, tug it upward, giving him additional play.

Now the fireman is at the window, peering into the interior. A moment later he is astride the sill and then disappears from sight in the smoke. He is carrying the fight to the fire, not waiting for it to come to him.

The billowing clouds of smoke that have hung over the scene slowly subside. Now only a white steamy stringer of vapor seeps from the openings in the roof. The fire is out. The streams of water have played their

part and the building is saved. Yet some of the firemen must remain, thoroughly to "wet down" the charred debris so there can be no possibility of the fire rekindling. The remainder of the engine company assemble their equipment and place it in its proper position on the truck. The hose-wagon men recover their lines, stack them in the truck. At a moderate pace, but wasting no time, the two companies return to their quarters. Let us examine this Pumper in detail and see how it works, see what it carries as equipment.

The Pumper is a model of compactness and efficiency. As its name signifies, it is a mobile high-pressure pumping station that can supply a great amount of water under high pressure at any fire. More, it is not dependent upon hydrants for its water for it can use ponds, swimming pools and rivers with equal success. If there is a source of water near it there is no difficulty in getting water on a fire.

To supply the water the Pumper is equipped with a one-thousand-gallon-a-minute centrifugal pump which is operated by the same engine that drives the truck to the fire. This pump is located behind the driver's seat and the controls operating the pump are on the left side of the truck as one faces forward. A

single lever operates the pump. Placed in one position, the engine drives the truck; placed in a second position, the truck cannot be moved although the engine can be operated. In the third position of the lever the pump is placed in action. The reason for the second-position control, is that there is always a possibility of the truck being moved during a fire while the supply lines are connected with the hydrant.

To take care of the volume of water delivered by the pump two types of hose are used. The first is the general service type which is tested to withstand a pressure of 600 pounds to the square inch and is three inches in diameter. There is another three-inch hose carried that is tested to 900 pounds pressure. The high-pressure hose is but two and one-half inches in diameter and can withstand a pressure of 1,200 pounds. In handling these different types of hose the high-pressure lines are easily distinguished by their hardness. The lower-pressure types are far more flexible. To reach the fires from the Pumper the truck carries 750 feet of high pressure and 500 feet of low-pressure hose as well as 200 feet of one-and-one-half-inch hose that is used to extinguish small fires such as brush and automobile fires where the interior of the body is aflame.

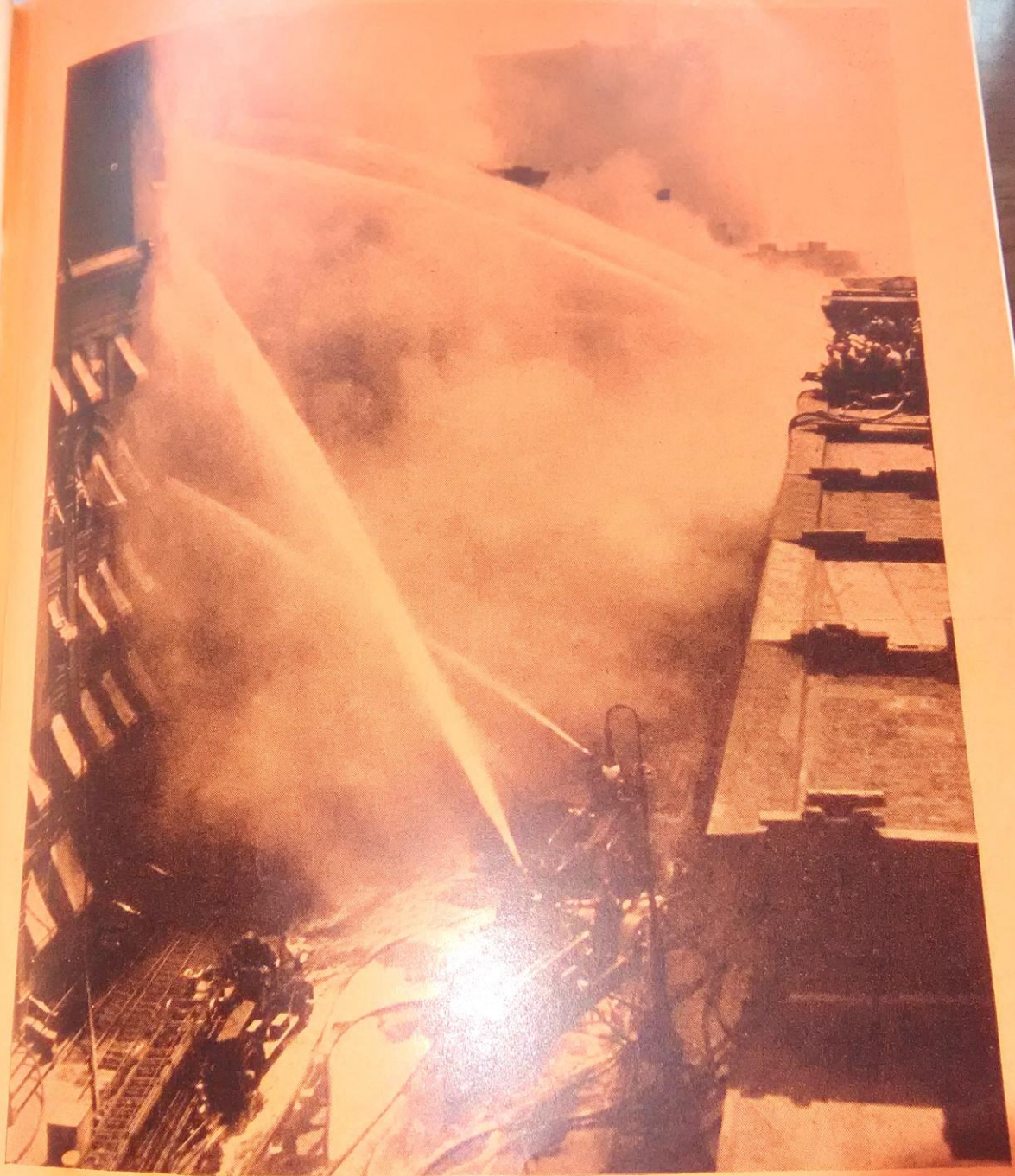
Using hose of various sizes necessitates the Pumper carrying various sizes of nozzles and reducers for the fittings so that the hoses may be coupled to the outlets. In addition to this equipment the truck carries two scaling ladders, one of twelve-feet length and the other fourteen feet. A large tarred-rope life net rests at one end of the body where it can be instantly removed and gotten into place below windows, in the event that flames are forcing people to leap for their lives when the Pumper arrives at the scene of a fire. In addition to the life net, the truck carries two one-hundred-and-fifty-foot ropes for lifesaving purposes as well as for the hoisting of hose and ladders.

You have no doubt noticed the brass outlets on the sides of buildings. These twin brass pipes protrude some inches from the side of the building and usually bear a small sign stating that they are for Fire Department Use Only and connect with the stand pipes. The stand pipes are a system of pipes running through the entire building and connected with the water tanks on the roof. In the event of a fire the firemen can cut off the connection to the roof tanks and then, by connecting the stand pipes with a Pumper, force water under high pressure to every floor of the building so that there is assured an ade-

quate supply of water to fight any fire. As a safety measure the Pumper truck carries rolls of hose to connect to the stand pipe system, for firemen are not sure that the hose in the building will withstand the pressures of the Pumper and so prefer to use their own tried and tested hose.

The stand pipe systems in a modern skyscraper are intricate and elaborate affairs. For instance, in the world's largest building, the Empire State in New York City, there is a high-pressure pumping station every two hundred and fifty feet of the structure's height. In this building's one thousand, two hundred feet of height there are five such stations supplying water for fire service even though the building is of fireproof construction. The building itself will not burn but its contents will. Likewise in all theaters seating over three hundred persons within the city limits of New York the law requires a high-pressure pumping outfit for fire-prevention purposes.

Naturally, working at high pressures, hose is apt to split from time to time as it is used and weakened by traffic crossing it. To avoid the necessity of shutting down the Pumper when this happens, the engine truck carries "jackets" which open like a clam shell and then clamp firmly around the broken part of



A fire department in action. Aerials, watertowers, pumpers all fighting a warehouse fire. (Courtesy Fire College, N.Y.F.D.)

Air mixing with super-heated gases causes a smoke explosion high in an apartment fire. (Courtesy Fire College, N.Y.F.D.)

the hose and stop the leak. In the event that the Pumper is called upon to use the water from a river or lake, the inlets for the pumps are equipped with large basket strainers which prevent dirt entering the pumps and breaking them. It is a sad thing that other strainers are necessary in the lines leading to the pumps, due to careless and thoughtless children opening the outlets of fire hydrants and dropping stones and dirt inside them. No thinking person would do such a thing, since in clogging a hydrant he might be the means of destroying his own home by delaying the work of the firemen.

In addition to all this material the engine truck carries wrecking bars to open shutters and doors, hooks for pulling down ceilings and walls, lanterns for warning signals, even a quick thawing device for hydrants which may have frozen in cold weather!

This neat and compact thawing apparatus consists of a small tank of compressed gas and a tubular boiler. The intense flame of the gas heats the tubes and the water is turned to steam which shoots from a hose and nozzle. This hose is thrust down into the hydrant and the steam soon clears any ice that may be there. In this way a frozen hydrant can be cleared in but a few minutes.

Situated immediately behind the driver's seat and on the top of the open truck body of the Pumper is the monitor. This is a brass nozzle controlled by valves and gears and fed from the pump by two heavy brass pipes. Coupled up, this monitor, or deck pipe as the firemen call it, can throw a thousand gallons of water a minute into a fire and it is used to drench and cool off large fires. Due to its great volume and the force with which it throws its stream, men alone could not control it and so it has the geared control we have mentioned.

Various small chemical extinguishers are carried on some of the engine trucks for fires in automobiles and such places where they can be used.

Although not the most spectacular equipment in the Fire Department, the Pumper is one of the most important. Its crew are the men who really "eat smoke" and carry the fight to the fire.

THE HOOK AND LADDER COMPANIES

CHAPTER III

THE HOOK AND LADDER COMPANIES

We Watch a Hook and Ladder Company in Action—Follow a Thrilling Rescue That Actually Happened—Inspect the Truck and Learn What It Carries and How Each Piece of Apparatus Is Used.

THE prone figure in the bed stirred restlessly, turned from side to side, coughed. For a moment the man was quiet. He dropped back into sleep but not for long. Something irritated his throat, made him cough. Half awakened, he opened his eyes, then closed them quickly. They stung and began to water copiously. Drowsily he pulled the covers over his head and tried again to settle into sleep. But the vague irritant refused to leave him, even under the protection of the covers. He coughed and then sat erect in the bed, angry that his sleep should be disturbed. He rubbed his eyes and yawned.

"Whazzamatter?" he inquired. "Huh?"

There was no one in the room and his question went unanswered. His half-awakened senses were still sluggish. Another fit of coughing attacked him. Suddenly he was awake. The message that his nose and

throat was bringing him had penetrated his sleep-drugged mind.

Smoke! Fire! And he was on the sixth floor of an old tenement that would burn like tinder. Hadn't he and his sisters been discussing that very thing only a few evenings ago? They had wished that they could afford to live in a modern fireproof building. The girls, sleeping in the next room, had dreaded the possibility of fire. Now there was smoke. He jumped to the door.

One hand grasped the knob and the other was against the panel. It was warm to his touch but he did not heed the warning. He did not know one should never open a warm door when there is danger of fire. He swung back the door.

A cloud of heated smoke and gas struck him like a blow. It sent him reeling backward. Unconsciously he had gasped when it struck him and he had filled his lungs with the mixture. Now he was doubled over, retching from the effects.

Thoughts of his sisters drove him on. He took a deep breath and darted through the door into the pall of the hallway. Groping his way, he found their door, turned the knob and threw it open.

"Sis! Sis! Wake up! Fire! Fire!" he shouted and made for their bed.

Startled, they sprang erect and then hastily slid from under the covers.

"Never mind anything! Come quickly! The place is on fire!" he shouted.

Grasping them by the hand, he half dragged and half led them into the corridor. Now the heat was intense and the smoke and gas so dense they could not see. Blindly he found the open door of his room. Roughly he thrust them in and stumbled after them. He knew they could never reach the back of the house where the fire escape might offer a way to safety if flames did not block the narrow iron stairway. Instinctively he sought the shelter of his own room, but —he left the door open behind him.

Flames raced up the stairway, licked at the banisters, ran over the paper covering the wall. It reached the corridor. Now its heat drove the man and the two women to the window of his room. He thrust it open and created a draft for the flames so that they drew into the room and hot gases added to the horror. The man and the women crouched beside the window.

The heat was so intense they could not stand it. They felt for the window sill and drew their bodies

over the edge. Hanging there, they gained a breath of air but smoke and flame from the lower floor swept upward.

Now the flames filled the room and it was but a matter of minutes until they would reach the three at the window. The women shrank from the menace, crawled farther onto the ledge until they were precariously balanced nearly seventy feet above the cement of the sidewalk. There was no going back and the only road ahead seemed the long drop to oblivion. Minutes would finish the tragedy.

A siren wailed around the corner and the great bulk of a hook and ladder truck swept into view. Seated on the driver's seat beside the man at the wheel, an officer swept the scene with practiced eyes. He saw the three figures crouched on the window sill, flames lapping behind them. He knew that there was less than a minute or so in which to act if they were to be saved.

He stood erect, snapped orders to the crew. The truck darted full speed to the burning building and ground to a skidding stop. The retainers were already out of the way on the great aerial ladder. A man crouched at the controls—ready. Down came the "Tormentors," the braces that steady the platform

where the ladder rests when erect. They were set in an instant. An order and the ladder sprang upwards. As it ascended, the turntable swung. Around came the ladder. The upper half, the lighter extension of the aerial ladder, started to come out of its "bed" and point upwards. In less than forty seconds the ladder was erect and starting to reach for the window and the three cowering people on the sill. And as the ladder began to drop in for the window a figure ran up the length of the ladder as it reached through the smoke and flame from the lower stories—the officer who had first seen the plight of the three.

The tip of the ladder, accurately placed, swung in for the window. The man, desperate from the heat and smoke, could no longer wait. While the ladder was still nearly ten feet out from the window he made a leap for its safety. His clawing hands found the sides and for an instant he hung there, then started to slip downwards.

The racing figure of the officer reached him, grasped his weakened hands, brought him to the ladder and then guided him around to the other side of it so that he could descend to where other firemen had climbed to aid. But the officer's job was not yet finished. There were still those two figures of the

women on the window sill above. Now they were half hidden in smoke and flame and lay inert—apparently lifeless. Fighting his way through the flame and smoke, the officer disappeared from sight of those below.

Momentarily the smoke cleared away and there was a groan from the crowd. Only one figure was visible on the window sill. Then the smoke closed in once more and left only the ladder extending into the pall. Suddenly a foot appeared out of the blinding vapor blocking the window. Another followed it, searching for the rungs of the ladder. Then the figure of the officer came into view and over his shoulder was the limp form of one of the women. He passed her body to the men waiting farther down the ladder and then immediately disappeared again into the smoke.

Now the smoke and flame were gushing out of the window in greater fury than ever as though maddened by being cheated of their prey. It did not seem possible that a human being could live in that inferno. The seconds passed, became a minute, two minutes—and still there was no sign of man or woman and the crowd silently prayed. Then a great shout went up from their throats. The officer was on the ladder with the other woman. His helmet was burnt and his coat

charred. His face was a mass of blisters from the heat and flame but—he had upheld the tradition of the Fire Department. He had effected his rescue. And none of the four suffered permanent injuries from the experience.

Naturally, in a fire and rescue such as the above—and it is authentic—all eyes are on the gallant fireman. But let us not forget the other firemen present. Let us watch the crew of the hook and ladder truck as they go into action at this fire.

Part of the crew are occupied at the aerial ladder during the rescue but the others are not standing by watching. The fire is in the upper part of the building. That means that the engine companies will have to get water into the upper floors and it is a part of the duties of a hook and ladder truck to prepare the way for the hosemen. Additional ladders are set against the building, windows are opened and men ascend to the roof to "ventilate" the fire.

Ventilation in modern fire-fighting plays an important part. Let us consider a fire that is burning either on the ceiling or between the ceiling and the floor above. If we leave it as it is it will spread out in increasing size until it reaches the walls.

But suppose that we manage to get above it and

chop a hole in the center of the floor, then open windows above, open the air shafts and even chop holes in the roof. All this will make a pathway for the heated air to ascend. We will start a draft upwards. This current will pour up from the hole in the floor and bring the flames with it. The fire, instead of spreading out will burn *inwards* towards the hole. And we have our fire concentrated there where we can readily play water on it to put it out. At the same time the openings we have created will draw off the smoke, heated air, and gases that are above the fire and make the rescue of persons in the building far easier. More, with the air clearing, the people in the building will not suffer from smoke and gas inhalation. So, when you next see firemen apparently needlessly opening windows or breaking the glass if they are locked, chopping holes in the roof and so forth, do not judge them wantonly destructive. They are saving life and property and making it possible to center the fire, extinguish it with a minimum of time and water, not to say damage!

Once that the crew of the hook and ladder truck have the building "opened up" the effects can soon be seen. In the ordinary fire it is a matter of but a short time until it is well under control and then put

out. In this particular case where we watched the rescue the fire was out in some twenty minutes after the firemen arrived although three floors were burning when they got the first water on the fire.

In order to understand the function of a hook and ladder company let us examine this piece of apparatus in detail, see what the truck carries as equipment and not only find out how it is used but watch it used at an actual fire!

The modern hook and ladder truck carrying an eighty-five-foot aerial ladder is sixty-two feet, nine inches, in overall length. Its wheelbase is forty-one feet, eleven inches from hub to hub! And the truck is seven feet, nine inches high. It is essentially a ladder truck, for the hook and ladder companies are primarily concerned with lifesaving and preparing the way for the engine companies, as we have seen. Let us look at the ladders on this truck we watched at the fire.

There are fourteen ladders carried by a hook and ladder company. The aerial ladder is, of course, the largest. This eighty-five-foot ladder rests on the top of the truck and is held down near its rear end by fasteners so that it will not bounce or sway out of place during the run to a fire. The base of the ladder is

mounted on a rotating turntable that is operated by gears so the ladder may be set in any position in relation to the truck. Other gears control its up-and-down movement and a rope and windlass extend the upper section of the ladder.

Upon arrival at a fire where the ladder is to be used the man at the controls watches the tiller man who is the driver of the rear wheels.

The tiller man releases the catch on his seat and windshield, lifts his steering wheel from its shaft and swings the entire equipment to one side so that it does not interfere with the raising of the ladder. Then he releases the rear hold-downs on the aerial, and signals that all is clear.

In the meanwhile other men have pulled out the "Tormentors" under the turntable. These are large steel braces that extend out from the sides of the truck and are firmly set against the pavement to brace the body against the swing and sway of the long ladder when it is extended. By means of these braces and locking the rear axle and frame with hooks, the ladder has a solid foundation in the truck body.

When all is clear aft and the "Tormentors" are set, the man at the ladder controls removes the retaining pin that locks the ladder in place and steps on the

spring release. Two gigantic springs encased in steel cylinders exert their thrust against the base of the ladder. It springs erect, so rapidly that a small hand brake is equipped to check the speed, for it might mount so fast that the sudden stoppage would snap the ladder.

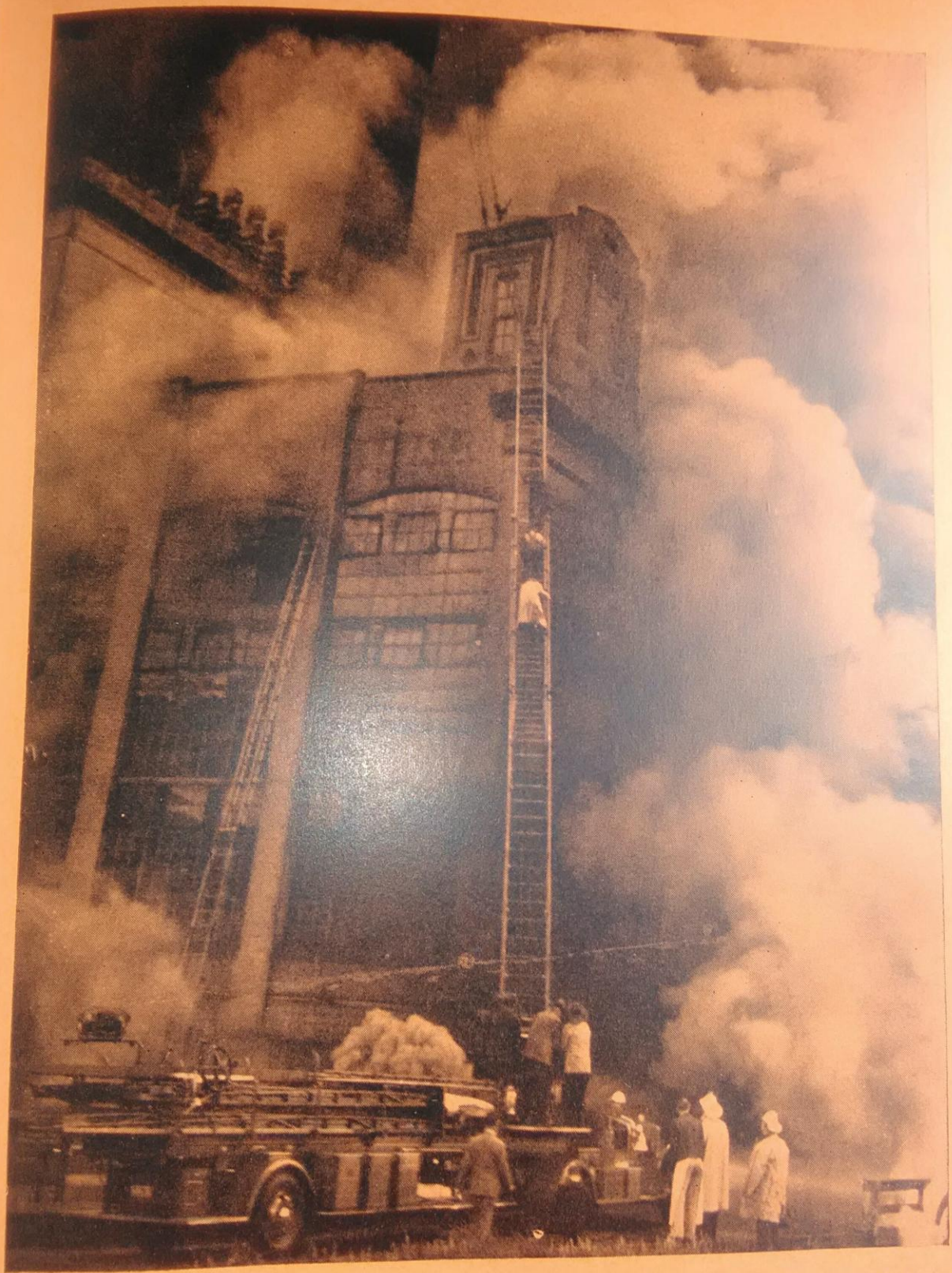
The moment that the ladder is at the angle desired the brake is applied and the ladder locked in position. Then the crank of the windlass is turned and the extension of the main ladder begins to rise out of its "bed." The rope, running over a pulley on the top of the main ladder and anchored to the base of the extension, slides the extension upward using the main ladder as a base or "bed," for it fits snugly into the top part of the main ladder, riding just clear of the rungs and held in place by guides and crosspieces. This uppermost part of the ladder is called the "fly."

The entire operation of the ladder from the down position to the up, and until it is placed properly at a window, can be effected within eighteen to twenty seconds! If you ever have the misfortune to be trapped in a burning building, stop to think of that. Firemen can have that ladder up to you in so short a time that there is little need to worry! Unless your way clear is certain, it is best to wait for the firemen.

They will get you out faster and more safely than you can yourself!

The placing of an aerial ladder is an art. It is not an easy matter to judge the proper position of the ladder from the street when its end is going to be eighty-five feet away. Also, the ladder must be placed exactly to be the most effective. When it is placed at a window the tip of the ladder should be slightly more than a foot from the sill so that when the weight of the firemen and hose come upon the ladder it will spring in against the sill. This counteracts the natural tendency of the ladder to sway up and down and makes it less springy when climbed so that the footing is surer. Men carrying down rescued persons or climbing with hose and other equipment need firm footing. But let us turn our attention to the other ladders on the truck for we have seen the aerial ladder in action in the first part of the chapter.

The truck carries two thirty-five-foot ladders which are the longest portable types in the department. These ladders are used a great deal and they give access to the second and third floors of buildings. Placed on the sidewalk with their tops against the sills above, they form a stairway for firemen either to rescue people or to drag lines of hose into the fire.



Firemen rescuing man from a factory fire. (Courtesy Fire College, N.Y.F.D.)

With Cherry St. Fire Department showing what was left of a small shack on top of which firemen were fighting the blaze – a brick wall crashed down on top of them. (Courtesy Fire College, NYFD)

Another use for these ladders is that of bridging a street. Often it is possible to permit traffic to flow past a fire by leading the hose overhead across the street. This is done after the fire is under control and never before, of course. One of the shorter ladders is placed at either side of the street and held upright by ropes anchoring it to the building or other places. Then a thirty-five-foot ladder is hoisted between the two and lashed into place over the rungs of the upright ladders. Hose is carried up and across the horizontal ladder and traffic flows beneath unhindered.

In addition to the other ladders the truck carries one thirty-footer, one twenty-five-foot ladder, a twenty-foot, a fifteen- and a ten-foot ladder. All of these are used according to how high the ascent is and how much room there is to maneuver a ladder. In tight quarters or where there is need of getting up in a skylight or some other place that is beyond the reach of a shorter ladder, the truck has a sixteen-foot extension ladder that collapses into eight feet for carrying purposes.

In addition to these ladders there are five other special purpose ones. A sixteen-foot ladder equipped with large metal hooks serves to climb ridgepoles of houses or to permit the firemen getting at gables.

Four scaling ladders serve to mount the face of buildings. In the chapter on the Probationary School we follow the use of one of these ladders while we watch a "rookie" fireman make a thrilling and gallant rescue. There we see the scaling ladder used to advantage, so we will not repeat its use at this time.

Hook and Ladder Company—we understand why it is termed a ladder company but what of the hooks? Each company carries twelve hooks. These are strong metal hooks mounted on poles of various lengths and used chiefly to pull down burning walls in the interior, open up ceilings and rip away lathwork. They also serve to pull apart burning debris so that it can be thoroughly wet down and the fire extinguished to the last ember.

The hooks on the truck are of twenty-foot, sixteen-foot, two of ten-foot, and six of six-foot length, besides two four-foot hooks for use in low cellars and ceilings.

Being chiefly concerned with the saving of life, the hook and ladder carries a life net. Let us watch this ten-foot disk of canvas in action.

A fireman is aloft in a burning building. The flames suddenly strike a store of highly combustible material and trap him. He is forced to the fourth-story window and this opens on the side of the building where it is

not possible to get an aerial ladder in position, for there is a small building at the base of the wall. Other ladders are not available or too short. The time is shorter still until the flames will force the fireman to jump or be burnt to death. He seems hopelessly trapped.

Flames shooting from the lower windows prevent rescue by scaling ladders for no man could live on the window sills while he raised his ladder to the next floor. And the time element precludes such work.

An officer grasps the situation. He barks an order. "Net! Net on that roof! Snap into it!"

The lifesaving net is slipped from its receptacle in the truck, carried to the ladders against the low building. Men swarm up them carrying the net and then the disk is opened under the point where the trapped fireman clings to the sill with flames all around him.

He gazes down, judges the distance, sees that the men are ready. The officer shouts an order to him that the net waits. Jump! The fireman throws his body out from the wall, falls feet-first for the net. As he falls he draws up his legs, and then, in almost a sitting position, lands with a resounding smack in the taut canvas. The men grouped around the edge of the iron ring bend under the impact, lower the net and spill

the uninjured fireman out onto the roof. A moment later they are busily engaged in returning the net and getting back to their other duties. Just a routine matter! For firemen!

Sometimes it is not possible to reach trapped persons either by scaling ladder, aerials or any of the usual means. Too great a height precludes the use of life-saving nets. Under these circumstances the Fire Department still has means of rescue. Each hook and ladder company carries a Lyle gun as a part of its complement. Let us see how this gun works.

The name has a familiar ring to it. There is such a gun employed by the Coast Guard for rescues at sea and we find that this gun used by the Fire Department is similar.

The Lyle gun resembles a short stocky shotgun but it does not fire a charge of birdshot. Instead it fires a leaden weight and this weight has a long light line attached to it. By aiming and firing the weight to an upper window or roof the light line—called a "cod" line and about as heavy as a deep-sea fishing line—is carried aloft to the trapped person. Another and heavier line is attached to the light line and this line drawn up and fastened securely. Then it is a simple matter to either lower a rescued person or to slide

down the life line oneself. Two one-hundred-and-fifty-foot life lines are carried in the truck and these, coupled together, will reach to the accurate limit of the Lyle gun's range, about three hundred feet. By the use of this gun persons can be rescued from as high as the twentieth floors of buildings.

In connection with these life ropes it might be of interest to know the simple procedure used by the firemen in dealing with the chimney fires often encountered in the suburbs. All the firemen do is attach a short length of fairly heavy chain to the end of the rope, climb to the top of the chimney and then lower the rope down so that the chain dangles at the base of the chimney. By slowly bringing up the rope and jerking on it the chain lashes around the inside of the chimney and clears the accumulation of soot so that the fire has nothing to feed upon and dies out!

The body of the truck stores a veritable warehouse full of gadgets. There are special nozzles for throwing water at right angles. These are used in the interiors of partitions and between floors and ceilings. There are life belts for the laddermen and those using the scaling ladders, three portable fire extinguishers of three different varieties—a Foamite for oils and gasoline, an ordinary soda and acid type and a liquid car-

bon dioxide tank for use in interiors where there is danger of damage to fabrics or other perishable materials. The truck even carries a portable electric light plant that will supply current to two lights of two thousand five hundred candlepower and twelve hundred candlepower.

Add to these tin cutters, giant snippers for metal, huge jacks to lift timbers and heavy obstructions, a multitude of special nozzles and hose fittings, a portable Prestolite floodlight, almost anything that may be essential to the saving of life and property.

The crew of the hook and ladder companies are perhaps more in the limelight than any other branch of the Department for theirs is primarily the task of saving life and they uphold the traditions of the Department in splendid style. They have an enviable record of valor.

THE WATER TOWER—A PORTABLE NIAGARA

CHAPTER IV

THE WATER TOWER—A PORTABLE NIAGARA

We Watch a Water Tower in Action at a Great New York City Fire. We Examine the Apparatus—Learn How It Is Used—Discover That It Can Discharge Over Four Thousand Gallons of Water a Minute, Between Sixteen and Twenty Tons of Water Every Sixty Seconds.

WINTER holds the city in its grasp with icy fingers. People hurry along the streets, collars pulled up and hats low against the wind. The street lights glitter in the cold clear air, signs flash and traffic speeds past. The electric sign on the marquee of the theater entrance in the Lincoln Square Building at Broadway and Sixty-sixth Street announces a double feature. The wide entrance is crowded with people sheltering against the cold while they await friends or merely gazing into the windows of the shops that line the interior of the entrance.

Suddenly there is a surge of people from the wide doorway that leads to the building. The building elevator descends, stops, the door is thrown back and those who are packed inside dart out into the entrance. The moment that the elevator is empty the attendant slams the door and shoots aloft. Then there

is the cry of "Fire!" from those who have rushed out of the elevator.

In an instant the cry is taken up by others and the crowd surges to the entrance at the street, sweeps across the sidewalk and turns to gaze up at the building. The cry echoes into the moving-picture theater and its patrons add to the confusion.

Excited occupants of the six-story building hear the cries of fire, open the doors of their offices and catch the acrid odor of smoke. They swarm down the stairs, crowd into the elevator and flee from the building. But minutes later there is the tinkle of broken glass, a puff of hot air and smoke and then the angry red of flame as fire bursts out through a lower floor. It races through the old structure, wraps hungry lips around the dry wood and leaps from floor to floor with startling rapidity.

Distant sirens and clanging bells under the shrieking of exhaust whistles announce the coming fire apparatus. They arrive in less than three minutes from the time that the alarm is sounded but by now the building is wrapped in flame.

The moment that the Chief sees the building he dashes to an alarm box and pulls the lever—sounding a second alarm. A third follows it shortly and then a

general alarm. New York is having one of its worst fires in years but it is not yet at its peak.

Now the lower floor of the building is a mass of flame, and smoke pours in clouds from the windows. The pall of smoke hangs over the street, spreads across the lowering clouds and a dull red reflection hangs over the district as the fire races to the roof and breaks through. Dense crowds of people gather at the scene, hamper the work of the firemen and finally are driven back behind tightly drawn police lines.

Countless lines of hose play on the fire from the width of Broadway and the narrower confines of Sixty-fifth Street. The heat beats across the elevated tracks and can be felt on the far side of the wide square where it warms the watching thousands. The buildings across the narrower street steam when the driven spray from the hoses touches the brickwork. Now the fire is raging from the basement to the sixth story and out the roof. Windows gush flame and through the empty openings can be seen the fiery interiors. A chair blazes in an office in front of a burning desk and near by stands a glass water-cooler intact. Then the heat does its work and the glass shatters, disappears. The flames mount higher, obscure the interior and one more room is added to the inferno.

A gigantic piece of equipment arrives on the scene. It worms its way through the maze of apparatus that clutters the streets. Nearly sixty feet long, weighing over thirty-two-thousand pounds, a water tower swings up beside the building and draws to a stop on Broadway.

The crew go into action. One man on the broad flat platform at the base of the tower, now lying flat along the length of the truck, draws out a retaining pin, watches until he sees another man release a like pin farther along the length of the prone tower, and then he presses his foot on a long lever beside the controls of the tower.

Huge springs held firmly in great steel cylinders exert their forty-eight-thousand pounds of pressure. The mighty water tower rears its head and swings upwards like some monster out of a forgotten age. A glittering brass nozzle gleams on the end of the steel latticework of the tower. Up swings the structure, faster and faster, and then it slows as the man at the controls uses his brakes. Now it is erect, the nozzle forty feet above the street, level with the fourth floor.

The nozzle begins to rise, mounting on a long neck of steel pipe until it is extended an additional twenty-five feet and now rests sixty-five feet above the street.

THE WATER TOWER

The crew of the water tower couple six throbbing hoses from pumping engines to the inlets of the tower which feeds that uppermost nozzle. The water rushes through the pipes and darts up the length of the tower, shoots from the nozzle and hits against the wall of the building.

Under the force of the stream the tower leans slightly backward, driven there by the pressure of the one thousand two hundred gallons of water driving out of the one-and-three-quarter-inch nozzle every minute.

Now the man at the controls spins a wheel and the nozzle points upwards still more. A turn of a crank and the great circular platform revolves, directing the stream into an opening that had been a window.

More lines of hose are attached to this monster with an apparently insatiable appetite for water. Four more lines feed another nozzle on the tower, this one set halfway up its length. It joins with the other in deluging the fire. Now six more lines go to the two monitor nozzles mounted on the tower's deck. These begin to play nine hundred gallons of water a minute each on the flames. Now the tower is driving four thousand gallons of water a minute into the burning building and the effect is soon seen. Wherever this

great deluge is directed, the yellow hot flames sink to red and the smoke deepens, changes and whitens as steam intermingles with the burning gases.

A white-helmeted officer rushes forward, stops, shouts orders and points aloft. High on the top of the building is a great ornamental cornice that hangs far over the sidewalk. Flames lick and curl around it and burning sections fall away. The whole cornice is ready to plunge down, endangering the firemen below.

The man at the controls of the water tower nods his head, turns to his controls. Up swings the topmost nozzle and its twelve-hundred-gallon stream crashes into the weakened cornice. A great section is ripped away like tissue paper, carried high into the air and thrown back into the burning maw of the interior. Again the stream swings and attacks another section. In turn it joins the previous one in the heart of the fire. Section by section the stream cuts away the cornice, hurls it back where it can do no harm. The men work below in safety now, the menace thrown clear by the water tower.

The tower is turned into the heart of the fire, hurling its great stream through the windows. One section of the building is yet ungutted by the fire. The stream from the water tower pours through a window,

strikes upward at the ceiling and cascades in showers the length of the corridor. The volume of water is beginning to tell on the fire. Streams from the streets, the deluge from the tower and a twin tower that has come into action on Sixty-sixth Street are having their effect.

The water tower on Broadway backs from the upper window where it has been playing and the entire structure of the tower swings around, lowers, then thrusts its nozzle directly through a window and pours its stream down into the flaming interior of the building. The controls at the base of the tower are swung so that the torrent strikes to all sides. Burning sections of floor hanging by twisted and warped girders are ripped away, walls fall, with plaster flying like leaves before a wind. The mighty force of the water drowns the fire, cools the building, clears the air.

The heat of the fire has started the face of the building across the street smoldering. Wooden window sills have been baking under the radiation of the fire, wisps of smoke are ready to flame. The water tower on Sixty-fifth Street turns its attention to this. Up comes the nozzle and a great curtain of water falls in front of the building. Spray rains on the hot windowpanes, settles on the smoldering wood, hisses from

the bricks. There is a cool damp draft of air from the falls created by the stream. The wintry air aids and the heat from the fire is cut off from the face of the building. For a few minutes the tower continues to throw its stream parallel to the face of the building. Then, when the officers calculate that the surface is sufficiently cooled, they direct the stream back into the fast waning fire. Now the street lines are into the building and the fire is overcome. Only small sections remain to be extinguished. The streams from the towers diminish, stop. The giant structures are lowered, hose is removed and stowed away and the towers return to their stations.

Let us examine this water tower as it rests on the floor of the fire house, the men having finished wiping and cleaning every part of it as they must do after every "run" a piece of apparatus makes.

The first thing that impresses us is its great length. It is fifty-seven feet from the bumper to the end of the prone tower. How the crew can maneuver this through narrow city streets and traffic is a mystery. It is an art! The secret is that all four wheels steer. The rear wheels are coupled to a tiller and the second driver sits here. By swinging the rear wheels he can maneuver the apparatus around corners, through the

Small frame buildings burn furiously but are soon quenched. (Courtesy Fire College, N.Y.F.D.)

Firemen in an ambulance for treatment of burns. (Courtesy Fire College, N.Y.F.D.)

maze of an elevated structure and between traffic.

The tower truck is seven feet nine inches wide, eleven feet high, with the tower flat, and weighs thirty-two thousand pounds—sixteen tons! The water tower can be raised and extended to its full sixty-five feet of height in thirty seconds. The first step in this raising we have seen. Pins that retain the tower in a locked position while down were removed and then the fireman at the controls pressed a foot lever and the tower sprang upright so rapidly under the thrust of the forty-eight thousand pounds of spring pressure that he was forced to use a hand brake to check its swing. Now let us see how the tower works, that is, see how the water is led into it and how they manage to raise the twenty-five feet of extension without the water leaking out!

The six inlets for water supplying the main nozzle of the tower all have what is called a "flapper valve" set in the mouth of the opening. This valve resembles a butterfly valve, that is, it is a flat piece of metal shaped to fit snugly into the inside of the pipe and when at right angles to the pipe it closes the opening completely. The valves are hinged so that water can force itself *into the pipes* but cannot flow out, for when it tries to do this the water catches the edge of

the metal flap and flips it tightly shut. The reason for these valves is to make it possible to connect one, two, four, five or any other number of hoses into the lead-ins to the main mast nozzle without water gushing out of the other openings. Hand valves would serve the same purpose but their action would not be automatic as is that of the flapper valves. As their name implies, they simply "flap" closed.

Water flows through the flapper valves and then into a reservoir, a long steel cylinder. From the cylinder it goes into fifty-three feet of four-inch hose which is coupled to the steel tube that leads it to the nozzle. The reason for this hose is to allow the extension of the tower to be raised. When it is hoisted the length of hose takes care of the additional length of the tower.

Firemen calculate the amount of water flowing through a nozzle by formula. If you should care to do so, here is the way it is done:

$$d^2 \times 30 \times \sqrt{\text{Nozzle pressure}} = \text{gallons per minute}$$

("d" equals the diameter of the nozzle)

So that this information can be readily obtained, all of the nozzles on the water tower—main, intermediate and monitors on the deck—have pressure gauges. Also

they have drains so that when the water is shut off, water remaining in the nozzle can be drawn off, eliminating the danger of its freezing and damaging the equipment.

One thing in particular has to be carefully watched when the tower is an action. The tower is swung on a large turntable which is braced by four legs that are lowered and screwed tightly into position before the tower is raised. These legs are the "Tormentors"—perhaps because they are difficult to set at times. But, remember the hose that connects the tower with the reservoir so that the tower extension can be raised or lowered? Well, should the operator of the tower forget that hose and turn the turntable over three-quarters of a turn, that is, two hundred and seventy degrees, he will twist the hose. "Corkscrew it," is the term the firemen use. And when he does that the water flow is cut. So he must be careful as he swings the turntable to direct the lateral play of the main nozzle.

During the Lincoln Square Building fire we saw two nozzles playing from the fire tower. Our attention was directed chiefly at the main nozzle set on the very top of the tower. Inasmuch as it throws the greatest amount of water and is used the most, we

neglected somewhat the intermediate nozzle. Let us look at that one.

The intermediate nozzle is set at the top of the base of the tower, the part that houses the extension. It is thirty feet ten inches from the street level when the tower is raised. Unlike the mainmast nozzle, this intermediate one can be controlled from the base of the tower so that it will play its stream in any direction without moving the turntable. Gears operate it. It throws a stream of one thousand gallons a minute and serves either to add to the upper and main nozzle or to attack the fire on a lower floor while the upper nozzle plays into the fire higher up.

We noted that there were two monitors mounted on the deck of the fire tower truck. These "deck pipes" are much the same as we find on the engine trucks and the fireboats. As a matter of fact, they are fairly standard wherever they can be mounted to advantage, for they concentrate a greater volume of water into a fire than can be controlled by hand. All of these monitors operate through gears. The deck pipes on the fire tower throw streams of nine hundred gallons a minute.

The principal use of the fire tower is to fight high fires—fires that are out of reach from the street and

must be attacked by the fireman from within the building. Often this is not easily done. There are no buildings close by that will give them a vantage point from which to throw their streams, and the fire itself may cut off access to the floors above the lowest point where the fire is raging so that the fire in the upper floors would burn unhindered.

With the fire tower these fires on the upper levels of buildings can be readily reached from the street. The tower will deluge the twelfth story of a building. Loft buildings and the types where large fires might rage, rarely reach beyond this point. In fact, they usually are ten stories or less. The great modern skyscrapers are thoroughly fireproof and their contents are not such as to feed a fire of this type. However, where materials of a more or less combustible nature are used in the great buildings, the construction under the building code is such that the doorways and stairways are blocked off by fireproof doors and the firemen have access to the floor. Also, sprinkler systems are installed so that when the temperature goes above a set point, the nozzles melt and play water over the interior. At the same time they automatically sound an alarm of fire.

In certain conditions the great strength of the

stream thrown by the tower can be used to demolish cornices are we saw it do in the Lincoln Square Building fire or it may even be called upon to hit the top of crumbling walls and send them back into the wreckage where they cannot injure firemen working on the ruins. The water tower is one of the highly specialized pieces of apparatus developed to combat conditions arising from the crowded conditions of modern cities where land is at a premium and floor space must be obtained by building to great heights. Here the water tower is at its best. It is essentially a fighter of high fires.

THE FIREBOATS

THE FIREBOATS

A Sea of Fire—the Heroic Fight of the Gaynor and Her Crew with a Burning Oil Barge—the Value of the Fireboats—the Great Service That Radio Telephone Renders.

NEARLY everyone has heard the tale of how a hunter grasped a bear by the tail and then found that he did not dare to let go. Captain John F. Kelly of the fireboat *Gaynor* found himself in much the same position but the gallant captain of the fireboat in this case was not considering his own safety but the safety of others when he did not dare to let go of a flaming oil barge in the Kill van Kull between Staten Island and the New Jersey mainland.

An oil barge containing fifty thousand gallons of highly inflammable fuel caught fire on the New Jersey side of New York Harbor. The barge eventually floated clear of the New Jersey side and ran on the tide into New York waters. Out went the *Gaynor* under Captain Kelly to fight the fire.

Beside the low length of the oil barge the *Gaynor* resembled a terrier attacking an animal the size of a full-grown bull. Only in this case the attacked was far

more deadly. Let us forget the present and go back to that day when a great disaster threatened New York Harbor and the cool courage of a fireboat captain and his crew saved the situation.

The captain and crew of the *Gaynor* are watching an angry red-based column of smoke on the New Jersey side of New York Harbor. It is a fire and a bad one. From the position it seems to be on the waterfront and that means that they may expect a call to help. Then the alarm comes but it is not to the New Jersey side they are going—it is into their own New York waters. An oil barge is on fire and adrift. Out goes the *Gaynor*.

As they approach the fiery barge in the Kill van Kull, the men on the fireboat feel the heat while still over a quarter of a mile away. Captain Kelly considers the situation. There is not a hope of getting a line on that inferno that was an oil barge. No man could live long enough to attach a line and it would burn through as soon as the flames reached it. Nothing but a steel cable would resist that fire and heat and the *Gaynor* carries none. Yet he must hold that barge and prevent it drifting into the shipping that lines the shore. If it does, there will be a loss of millions of dollars not to mention the possible loss of life fighting a

general waterside fire. Kelly makes his decision and grasps the bear by the tail. He drives the *Gaynor* dead into the fire and places the fireboat's blunt nose against the stern of the barge.

The heat, as they near the fire, is terrific. The crew are driven from the deck. The paint blisters, peels, bubbles and simmers. Windows are too hot to touch without burning a hand. Cracks check the panes where the heat is crumbling the glass. The ventilators are drawing down this heat into the engine room and adding to the already high temperature there. The stokers are wet with perspiration; the air can hardly be breathed.

Yet in spite of everything Kelly must hold that barge and beach it if possible. He directs streams of water on the fore part of the fireboat. Water cascades over the entire bow and the pilothouse. Only the bow monitor throws its stream into the fire. All other streams are on the boat itself to prevent it bursting into flames from that withering heat.

Slowly the *Gaynor* edges the fiery barge up the channel. Both sides are lined with industrial plants. Not a chance to beach the barge there without setting the entire waterfront afire.

"Where can we beach her?" Kelly demands of the pilot.

"There's a place about two miles up the channel that's clear—if we can make it!" he answers.

"We'll make it, all right. We have to make it!" Captain Kelly grimly replies.

Suddenly a new problem faces the intrepid commander of the fireboat. The burning oil in the barge has heated the entire fifty thousand gallons to the boiling point. Now it begins to boil over the low freeboard of the barge and spreads in a rapidly increasing area over the surface of the water. The very water itself seems on fire and burning. And in the midst of this inferno, now lost to view of those on the shore, is the *Gaynor!*

Every available stream of water with the exception of the bow monitor is now playing on the *Gaynor*. She has turned her water "guns" against herself to survive. So intense is the heat from the burning barge and the sea of fire floating all around on the surface of the water that the streams coming from the great nozzles of the fireboat are steaming hot! The fire has heated the entire surface of the water and made it hot enough to steam! The *Gaynor's* pumps are sucking in hot water and throwing streams of scalding spray!

Slowly the fireboat noses its way up the channel. Other shipping coming down the channel gives the burning barge a wide berth. In the wake is a flaming curtain of fire that gives off dense clouds of smoke. A great pillar of oily black smoke marks the barge. The black of the smoke is laced with deep red where the heated gases still burn hundreds of feet above the surface. On the *Gaynor* all sense of time is lost. There is only the insufferable heat and the dull roar of the flames, the hissing of the streams as the hot water strikes the hotter surface of the boat and changes to steam in an instant.

The pilot has been scanning his chart.

"There's a small open space over there where we might beach her in safety. Pretty low water, though!"

"We'll try it," Captain Kelly announces. "Sure that it's clear? Nothing there we'll damage?"

"Clear enough if we can make it!" comes the reply.

The *Gaynor's* helm goes over. Gradually the flaming hulk ahead eases towards the shore. Then Captain Kelly sees something that makes him spring to the controls, stand ready for an emergency. The streams from the nozzles now are dark, colored with mud. The *Gaynor* is in shallow water and the intake to the pumps, set low on the sides of the hull, is sucking in

the sediment from the bottom. Kelly dares not risk grounding his boat for with a falling tide she might be left there while the barge, momentarily becoming lighter and shallower of draft as her cargo burns, would drift away unattended. The *Gaynor* stops and the barge slowly drifts into the shore.

It grounds and the *Gaynor* backs off, stands by as the crew pour up on deck for a breath of air. Now Kelly takes stock of his boat. The upperworks are burned clear of all paint and the wood is charred. Every window forward is cracked with the heat. The bow is a shambles. It has been subjected to the full fury of the heat and flame and shows the effects. A hose reel is burned away, lines of hose on the deck are now but lines of sodden ash and melted rubber. Only the brass bow monitor still is intact and plays its stream on the barge. The *Gaynor* is bruised and battered as is her crew but still full of fight. She edges in closer where she can get her streams in play on the fire.

But the respite is not for long. The tide ebbs and as it does so, the barge lightens enough to float free again. It starts out into the channel and once more the *Gaynor* breasts the burning water and shoves her blunt nose into the sea of flame. Ten hours later she is still

bitterly fighting a lone battle but in the end her gallant captain and crew win. The fire is finally extinguished and when the *Gaynor* returns to her wharf she is ready to be sent to the slip for repairs. But let us consider one vital element that is lacking in this lone battle against the fire.

All through the fire the *Gaynor* has been on her own, unable to communicate with the shore. If she had broken down, if her captain had made a mistake and lost control of that flaming barge, millions of dollars of damage would have been done. And all for the lack of one essential to a fireboat—radio communication.

Captain Kelly was alone with his boat. Other fireboats were within easy call by radio yet he was left to fight the menace. That fire and the fact that only the most valiant and skillful work on the part of commander and crew saved a major disaster had much to do with the installation of radio on fireboats. It changed the entire scene. Now a commander could report conditions, receive orders or request help. Take, for instance, the time that Captain Kelly and the *Gaynor* responded to a large fire in a lumber yard located on the Erie Basin of New York Harbor.

The *Gaynor* is steaming full speed across the Lower

Bay and ahead is the Erie Basin. Smoke and flame show where a lumber yard is afire. As the Gaynor is still some half-mile from the water's edge Captain Kelly is scanning the scene with powerful glasses. He sees a motor vehicle trapped in the lumber yard. The piles of lumber all around it are on fire. For a moment he closely examines the motor but apparently there is no one either in or near it. It has been abandoned. He is about to focus his attention in another place when some movement catches his eye. Back comes the glass and then he sees a figure stagger out of the cab. There is a man there, trapped by the fire!

Kelly senses that there may be a chance of saving the man. If the *Gaynor* can get there in time he can play streams of water on the spot until the land companies can work their way into the position and rescue the man. But—in the meantime the heat is going to be intense and the man will suffer. Kelly, still a quarter of a mile away, goes into action to rescue and aid the man! He turns to the radio, snaps an order to the operator.

"Report a man trapped on the outer edge of the yard! Get an ambulance! We'll stand in close and cover him with lines until the land companies can get into him and get him out of there!"

A smoke ejector truck – this apparatus is used either to pump out smoke or inject fresh air. (Courtesy Fire College, N.Y.F.D.)

A fireman lectures a high school class on fire prevention. (Courtesy Fire College, N.Y.F.D.

He did just that and the ambulance he had ordered while still a quarter of a mile from the scene took the man to the hospital, where he recovered.

Years of experience and countless different situations all have shown the value of the fireboat. But for the first time every conceivable thing that would tend to make a fireboat more efficient has been built into one. As a result the vessel costs nearly one million dollars! Let us make a trip through the latest and most modern of all fireboats, the *Firefighter* of the New York City Fire Department.

THE *FIREFIGHTER*–WORLD'S MIGHTIEST FIREBOAT

CHAPTER VI

THE *FIREFIGHTER*—WORLD'S MIGHTIEST FIREBOAT

We Go to a Fire Aboard the "Firefighter"—See Her in Action—Make a Trip of Inspection through This Most Interesting of Vessels—Learn Its Uses and the Equipment She Carries.

NIGHT cloaks New York Harbor but the ceaseless activity of its water-borne traffic flows on. Ferryboats, alight from stem to stern, tugs, puffing importantly as they tow great hulks of barges, giant liners setting out to sea and distant lands and ports, smaller craft darting on endless errands: all these dot the waters and streak it with lights. Their incessant whistle signals fill the air with sounds at times dissonant and at others approaching the melodic.

Suddenly the yellowish-orange glow that hangs over the great city is tinged with a deeper hue. A deep red, flickering at first and then blooming into a steady halo of light, centers over the waterfront. The shrill wailing of countless sirens ashore pierces the deeper tones of the harbor traffic. Clanging bells echo hollowly through the canyons of Manhattan as rushing fire ap-

paratus converge on the flare that marks a waterfront fire.

At the very tip of Manhattan Island, huddling in the shadow of the towering skyscrapers, men dart from a low two-story building, run along the wharf and drop on board a low broad-beamed vessel. For a moment the movement of the men seems all confusion and then one realizes that it is not so—each goes to his appointed station and takes up his duties. Lines are quickly cast off, a puff of smoke springs from the squat stack of the vessel and there is a deep murmur of powerful engines as bells jangle imperatively in the depths of the hold, the water at the stern churns under the thrust of the screws and the boat heads her blunt nose out into the stream of the Hudson River.

A long finger of light, its million five hundred thousand candlepower so intense that its fringes are a weird electric blue, stabs the night and then the air is split with the shrieking of sirens blasting across the waters their demand for right of way for the fireboat *Firefighter*—the finest and most modern of her kind in all the world.

On her foredeck, bathed in the diffused light from the searchlight beam, cluster the five monitors—huge nozzles of brass geared to turn in any direction and

fed by twin pipes that thrust thousands of gallons of water a minute into their hungry maws. Now the monitors are silhouetted against the light and resemble the grim guns of a ship of war. And guns they are, firing their powerful streams of water in the battle against fire.

The *Firefighter* swings upstream and under the drive of her two one thousand five hundred horsepower electric motors she thrusts her thirty-two foot beam through the water at better than sixteen miles an hour.

The black current of the Hudson turns to white in her bow wave and trails a silvery ribbon astern where the broad wake churns. Now she is under full way. She swings wide around a vast dock which reaches out into the stream to hold the gigantic hull of the *Normandie*. Ahead, the water changes from oily black to red under the reflected glow of the fire. She rounds another pier and there, ahead like a burning beacon, is the fire.

Far out at the very end of a pier flames sweep through the structure, engulf the stowed cargoes from vessels that even now are hastily backing into the stream to escape the fire. Ashore can be seen the land companies of firemen, their gleaming red apparatus

parked in the wide street and countless lines of hose leading like great strings of spaghetti into the building. The *Firefighter* dodges the retreating vessels and boldly points her blunt nose at the inferno.

There is a hiss of air from the foremost monitor on her deck. At first it is a soft sigh which rapidly changes into an explosive "Wah!" and then a rigid column of water shoots from the monitor's nozzle. It leaps across the intervening gap between the *Firefighter* and the burning pier, and crashes against the side of the building.

Strong gears rotate and swing the monitor's nozzle, for no man could control its force unaided. The stream of water hits an opening filled solidly with flame. A while before, it had been a window. Now its panes are shattered, melted by the heat. The stream from the monitor strikes into the opening.

Six thousand five hundred gallons of water a minute under the impetus of one hundred and fifty pounds to the square inch, drive into the fire, catch the window frame and sash and carry them before it, ripping them out as though they were made of paper. The outpouring flames are driven back, the red glow in the window changes to a deep tone, the smoke grays as the driving torrent of water eats into the fire and quenches it.

But a long length of the pier is ablaze. The other monitors spring into action, hurling four more streams into the fire. Grouped behind the great bow monitor, these four pour three thousand gallons of water a minute each. Now eighteen thousand five hundred gallons of water are crashing into the fire every minute, sufficient water to completely fill the average swimming pool in less than sixty seconds!

A section of the roof sags, sways drunkenly for an instant and then falls with a dull roar. Flames shoot skywards and their ruddy light turns the night to day. Just aft of amidships on the *Firefighter* a spidery steel skeleton springs to life and slowly rises from its prone position. Deliberately yet not slowly it rears its head crowned with a high circular railing enclosing a gleaming brass monitor. The thirty-six-foot steel tower—a water tower—reaches the erect position. Electric motors, operated from the deck, swing the monitor. Around it comes until its nozzle points down from its fifty-five feet above the water line. Another control is operated at the base of the tower and a stream of water shoots from the monitor, crashes through the fallen roof and beats down on the fire. Three thousand more gallons are streaming in to stem the flames. With the advent of the tower monitor into the battle

one of the forward deck monitors is cut off to relieve the four two-stage centrifugal pumps so that each sends not less than five thousand gallons of water surging through the pipes at one hundred and fifty pounds to the square-inch pressure every sixty seconds.

Landward, the companies from shore are fighting a valiant battle. Theirs is the task of checking the advance of the flames along the pier until the arrival of the fireboats. Now the *Firefighter* moves in closer to the inferno, pouring a Niagara into the heart of the fire. The heat is intense, men on deck shield their faces against the glare. The great streams rush with a sibilant deep whisper from the monitor nozzles. Gears rotate, swing and control the immense force of the water, direct it at the touch of a finger through the magic of electrical control.

Steelwork in the pier softens under the heat, bends and twists into grotesque shapes. Flames leap high. The bow monitor swings, directs its mighty stream against the corrugated iron side of the building. There is a hollow drumming of water on metal, a rending crash and the force of the stream tears the great sheets of iron from their fastenings, hurls them flying into the fire and lays bare the burning cargoes.

Huge bales of goods, burning fiercely, topple and

fall under the force of the stream. They change from fiery red to dull ruby and then blacken to smolder and emit a light grayish smoke, blue when the powerful searchlights sweep the scene. The ruddy halo in the sky above the fire dims, flares fitfully. The huge column of black smoke turns to gray and white and loses itself in the night. The fire sinks, dies, but the endless thousands of gallons of water never cease. They crash over the glowing embers, cascade against strong pillars warped by heat and hissing steam like angry cats when the water strikes them.

Nearer moves the *Firefighter*. Soon she is alongside the pier. Men spring into action. Lines are coupled to the great circular brass hose manifolds on the stern of the boat. These manifolds, like great brass barrels standing on end, each has outlets for twelve three-and-one-half-inch hoses. Now the monitor streams subside as the fire smolders and the crew of the *Firefighter*, having beaten back the enemy, charge in to close quarters for the final coup de grâce.

The lines are strung into the wreckage of the pier and charged with water. Their flattened lengths grow round and hard and men at the nozzles brace against the pressure of the streams. Only scattered remnants of the fire are left, here and there flames showing like

small bonfires. Underfoot is a thick carpet of black embers, sodden with the drenching from the monitor streams. The land forces fight their way forward, soon join with the marine division and the fire is now "under control." The process of "wetting down," quenching the last glowing ember so that the fire cannot spring to life anew, is left to the land forces, and the *Firefighter's* crew withdraw.

She reports by wireless telephone to Fire Headquarters and soon is steaming back down the Hudson to her berth at the Battery. Once there, she ties up and Engine Company Fifty-seven is ready for duty again, but work is not done for her crew. Countless tasks face them. Machinery must be checked, cleaned, lines of hose drained and dried, returned to the great reels on the stern. The entire ship is made thoroughly "shipshape," clean and spotless in every detail.

Now that we have watched the *Firefighter* in action, let us make a trip of inspection through her and see this most complicated and efficient of all fire-fighters.

The first thing that impresses us as we gaze down from the dock at the *Firefighter* is her obvious sturdiness and her great breadth of beam. She is broad for her length—a thirty-two-foot-three-inch beam for an overall length of one hundred thirty-four feet. Her

draft is shallow, only nine feet five inches, for she must be able to work close to shore. In a like manner, she has no high upperworks to prevent her passing readily under bridges. She measures but twenty-four feet three inches from her load water line to the topmost part of her structure. Yet, broad as she is, she has a fair turn of speed—sixteen and one-quarter miles an hour.

We enter her upperworks through a steel door and descend a stairway to the engine room. As we pause at the entrance we are astounded by the perfect maze of pipes, machinery and other appliances that fill every part of the room. It seems as though every available inch is used, as indeed it is. And there is another surprising thing—we have always associated dirtiness with engine rooms, but here is no dirt—everything is spotlessly clean. The paintwork glistens, the brass glitters, even the black paint on the metal floorplates shines. We can look in vain for dirt in this engine room, or in the entire boat, for that matter.

Going down a short stair we step onto the floor of the engine room. To our left and right are the two sets of pumps, four in all. They are DeLaval centrifugal pumps of the two-stage variety and capable of delivering five thousand gallons of water a minute

each. Their total output is over twenty thousand gallons of water a minute and under a pressure of one hundred and fifty pounds to the square inch. To appreciate the vast amount of water that these pumps can deliver, just stop to think that they could fill an average room full to the ceiling in less than a minute or, as we have said before, fill the average swimming pool in about sixty seconds. Small wonder that this modern fireboat can so successfully combat fire.

Immediately behind the pumps are the engines, great twin-banked Diesel types having sixteen cylinders and each gleaming mechanism develops a full one-thousand-five-hundred horsepower when turning seven hundred and fifty revolutions a minute.

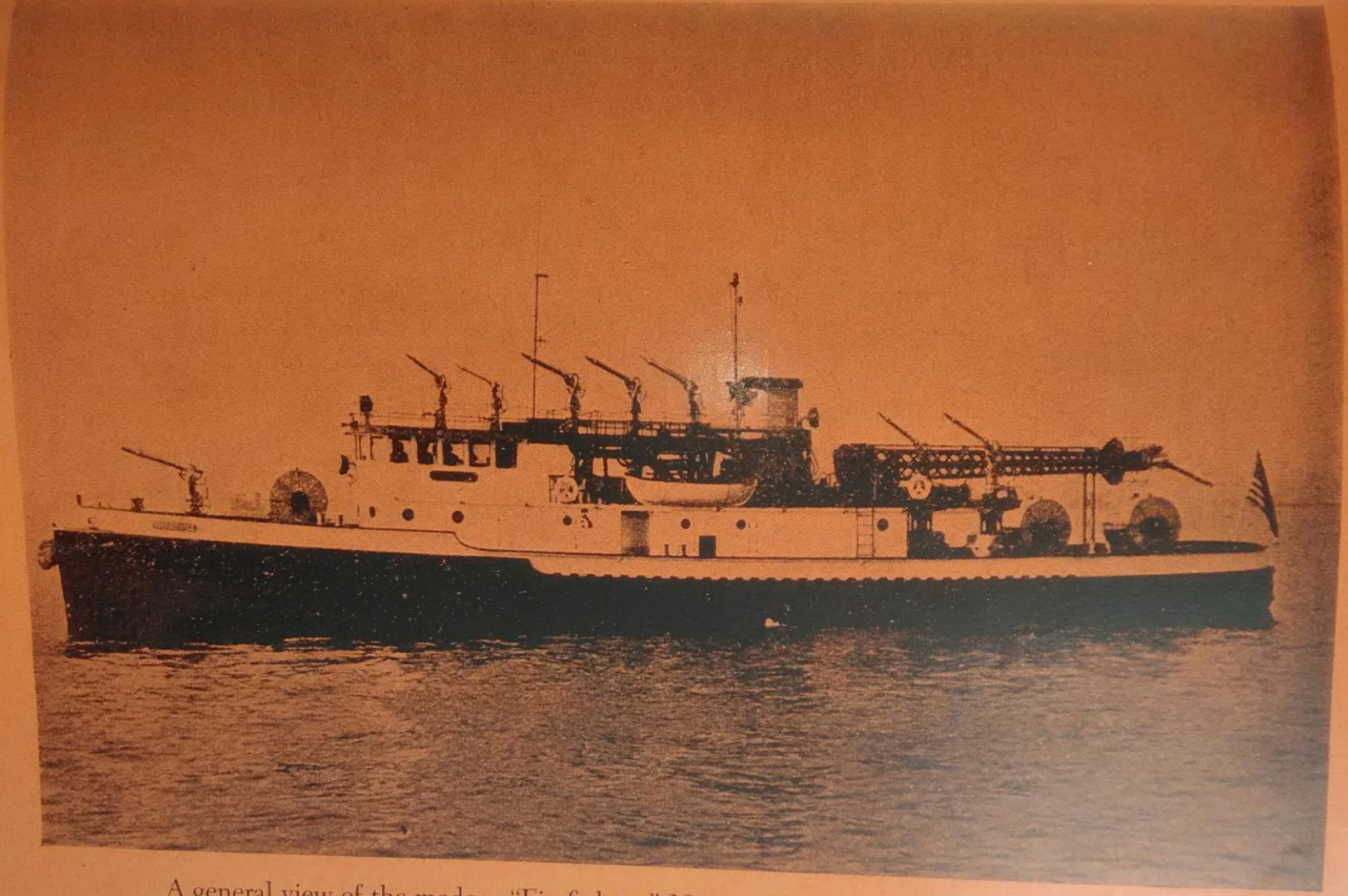
Strange as it may seem at first, the engines do not directly drive either the pumps or the twin six-foot propellers that drive the boat. The engines turn generators, three to each engine, two main generators and one exciter, all mounted in tandem. These generators develop the current for the two great one-thousand-horsepower motors that drive the propellers—one motor to each screw.

There is a definite reason for this seemingly peculiar method of utilizing the power of the engines. If they were coupled to the drive shafts directly through the

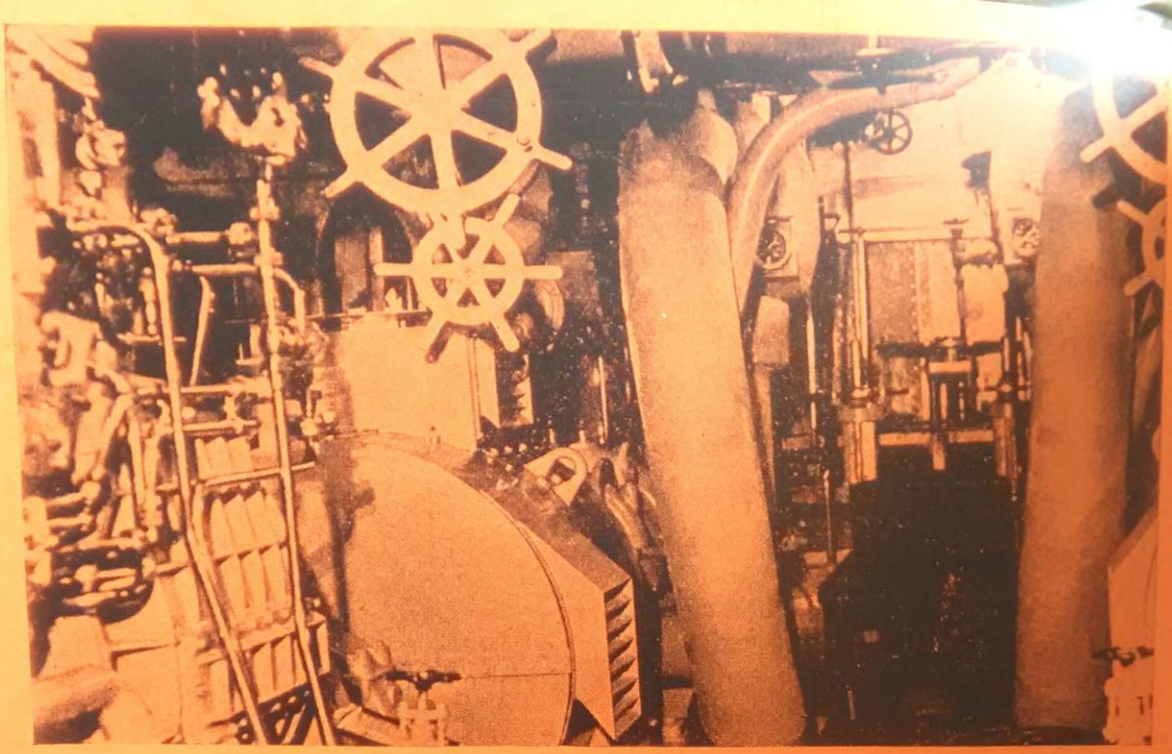
medium of gears as in an automobile, the drive would not be as flexible as that of the electric motors. By use of resistances the current fed to the motors can be varied and the speed of the motors adjusted to any degree desired. This same system is used in our great aircraft carriers and battleships as well as in the huge liners that ply the oceans.

These electric motors that drive the screws are set well aft of midships in the vessel and between them and the engines are generators which the engines turn to manufacture the electrical current that supplies all of the power for the various machinery in the boat. She is electric throughout with the exception of the Diesels which were selected as the original power unit due to their reliability and their compactness. Also, using fuel oil, there is no hazard of fire and explosion as there would be were huge quantities of gasoline carried for gas engines. Steam drive would necessitate boilers and bunkers for the coal and make the boat far larger to accommodate the same equipment.

Behind the great driving motors is another platform and here are grouped the engineering controls and instruments. Loud-speakers carry orders from the bridge; manually operated controls duplicate the orders so there is no possibility of mistakes. On this platform are

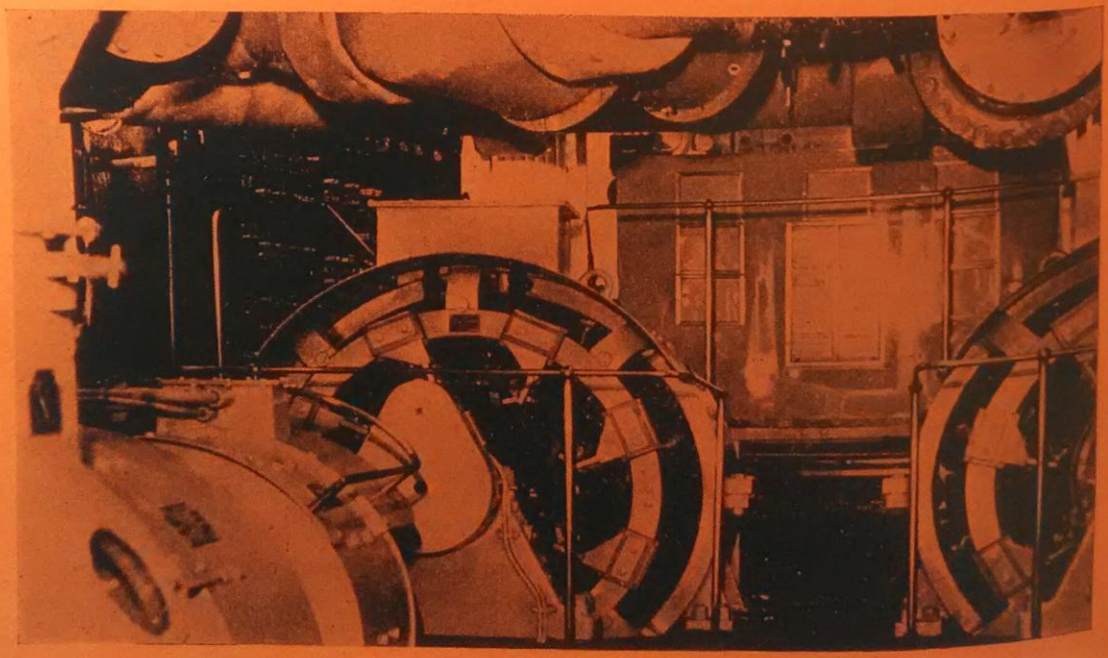


A general view of the modern "Firefighter." Note her monitors in the "ready" position. (Courtesy Rappoport Studios)



Here, under the two spoked wheels in the left foreground, is one of the twin banks of pumps in the "Firefighter." At the extreme left is one of the engines, center, discharge pipe. (Milton Photos)

The great 1000 horsepower electric motors of the "Firefighter." Ahead of the motors can be seen the generators and a part of the huge 1,500 horsepower Diesel engines. In the background (left) is the switchboard controlling the electrical circuits. (Milton Photos)



the various instruments that tell the engineering officers how the mechanism of the boat is functioning.

To the left of the platform as one faces it, is set a huge switchboard that controls the electrical circuits throughout the vessel. Every part of the walls seems cluttered with instruments, switches, controls and machinery. About the only other thing in modern craft that compares with this engine room of the *Fire-fighter* for compactness and simplicity is an airliner's pilots' compartment.

Walking back through the engine room and ducking our heads to avoid striking overhanging pipes and machinery, we pass back to the stairway and the platform at the upper end of the room. Here, through an open doorway, we can look forward to the crew's spacious quarters. Rest and comfort are apparent everywhere. A wide table serves as a place to eat and when cleared, a place for games and reading. Reading forms one of the crew's chief diversions in the little spare time they have. And fiction has but little place in their reading. Study comes foremost, for these modern fire-fighters are men who make a career of their work, and study is the most important part of a successful career. As we shall see in another chapter, promotions depend upon their grades in the examina-

tions and the difference of a few points in the results can make a great difference in the ultimate success of a man's career, for the competition is keen and close.

Climbing the steep stairway, we come to another room, small and partly circular. We stop and stare in wonder. This room is filled with gleaming brass nozzles—they abound in every size and shape. Great thick nozzles for the bow monitors, smaller ones for the hose, wide-mouthed ones, small-mouthed, nozzles with shut-off valves in the base, some with blunt and closed ends but having holes around the sides of the tip so that the water is shot at right angles to the nozzle—for fires between narrow spaces. They can be thrust through holes chopped in the burning walls or floors and their streams scatter in every direction to flood out the fire. As we let our eyes rove over the myriad brass nozzles, every one of them spotless and bright, and stop to think of all the gleaming brass on the decks above and the bright work in the engine room, we begin to wonder how many gallons of brass polish the *Firefighter*'s crew must use in a day!

Above the nozzle room is the bridge—the control room of the *Firefighter*. It is circular, and wide windows give an excellent view all around. Opposite the center window stands the big compass and immedi-

ately behind it, placed so that the wheelsman can keep his eyes on the compass reading, is the wheel for guiding the vessel.

Between the wheel and the compass is a quadrant marked off in degrees. A pointer follows this scale and shows the helmsman the exact amount of port or starboard rudder he is using so that if the pilot orders so many degrees of rudder to either side during thick weather, the helmsman can steer the vessel accurately.

On the right as one faces forward is a comfortable wide settee where the men can rest or an injured man be placed. Immediately to the left of the compass is an instrument board which shows the captain the revolutions per minute of each screw, the speed of the motors and the amount of current being generated by the generators.

Aft of the wheelhouse and the upperworks is placed the water tower, one of the most interesting features of the vessel. This thirty-six-foot steel tower, of the conventional "lacework" pattern, lies prone on its two supporting arms. Its monitor or "pipe," in the firemen's slang, points downwards to the deck and the national ensign floating on the stern staff. At the right of the base of the tower is a small steel control box and here are centered all of the "gadgets" that control the

tower. A flip of a valve and its length slowly rises as compressed air forces the oil in a tank set low in the hold, up through pipes and into the cylinders attached to the tower. The incoming oil causes the pistons to be driven down and these are connected with the tower and make it rise to an upright position where it locks in place. When it is desired to lower the tower, the oil is slowly released from the cylinders, the pistons return to their former position and the tower sinks slowly and safely as they do so. The returning oil flows into another tank and from there it is returned to the original tank where the high-pressure air is connected to raise the tower when it is again necessary.

The nozzle of the monitor in the tower is fifty-five feet above the water line when erect and there is a round railing placed at the top of the tower so that a fireman can stand safely beside the monitor and direct the stream.

But the control of the monitor is not in his hands. All of the control is through electric motors which are operated from the deck below. Motors elevate the nozzle, depress it, turn it from side to side in any direction.

On the topmost deck of the *Firefighter*, really the roof of the pilothouse, are clustered more monitors.

Here is a battery of them, four three-thousand-gallon-a-minute "pipes." Farther aft, set to either side of the water tower, are two more flanking the sides of the vessel. In all, this most modern of all fireboats mounts eight monitors, one of 6,500 gallons-a-minute capacity, five of 3000 gallons capacity and two of two thousand.

Dropping back to the deck again, we pass the upperworks and come to two great brass cylinders with twelve outlets for three and one-half-inch hose on the sides of each. These are the manifolds we saw used at the fire when the crew coupled lines of hose and went directly onto the pier. Each of these huge brass cylinders has coils of heating units enclosed around the pipes feeding the outlets so that they cannot freeze in wintertime. Behind them, nearer the stern of the *Firefighter*, is an even greater brass cylinder and still farther aft, almost at the stern of the boat, is another like it. These are the hose reels. Each accommodates twelve hundred and fifty feet of three-and-one-half-inch hose. Another such reel is forward immediately behind the great bow monitor we shall visit soon. This forward reel holds fifteen hundred feet of two-and-one-half-inch high-pressure hose.

Going to the bow we examine the great "deck pipe" there. At first glance it reminds one of the gun placed in almost a like position on the bows of a destroyer and it is, if anything, almost as large.

Twin pipes of heavy brass lead the water into the monitor and her five-inch nozzle has vanes set deep in its throat so that the water is "smoothed" out in its flow and emerges as a solid stream flowing smoothly and throwing a minimum of spray. This concentrates the volume of water and gives the stream a far greater efficiency.

Now, let us consider this "pipe" for a moment. We saw it in action on the pier fire, saw it sweep the windows away, sash and all, as though they were paper. But we did not see this "deck pipe" at its peak. Under extreme conditions the pumps of the *Firefighter* can force over eleven thousand gallons of water a minute through this monster. To realize what this means just consider the weight of water it is throwing—over FORTY-TWO TONS A MINUTE, THREE-QUARTERS OF A TON OF WATER A SECOND! Such a stream will crash through a sixteen-inch brick wall and tear it apart. It will cascade against a high brick building and demolish the walls! Shot di-

rectly into a fire it will rip and tear the interior of the building, shatter the contents, and create havoc in general.

Naturally, the New York City Fire Department wants no such action from the stream, for the Department makes every effort to keep the damage from water down to a minimum. Water must be used to extinguish a large fire and water damage cannot be avoided, but it can be controlled. Why, then, you may ask, such a monstrous deck gun with such potential danger from damage? The answer is simple.

This great monitor can reach into a fire from a distance, it can send its stream enfilading through a pier and drench half its length. Directed against a ceiling, it spatters a great shower over the interior and covers the fire. If the emergency arises, the pressure on the monitor can be increased and its great force used to open holes in a wall or to batter down obstacles that are preventing the firemen from reaching the heart of a fire. There, in so doing, its destructive force is not destructive but one that is saving property, for it makes the checking and extinguishing of the fire a less difficult matter and the damage is lessened.

Superficially, we have gone over this sturdy boat. It takes days to go through it in detail, and weeks to

become familiar with it throughout. The author spent the better part of two months around the vessel learning its workings. Instead of going into a dry dissertation of the data regarding the *Firefighter*, let us instead simply check what else this compact unit carries into battle against flame.

She is equipped with two chemical extinguisher systems. One is using carbon dioxide and the other—for use against oil fires and their like—is Foamite, which takes its name from its appearance. It is a foamy substance for all the world like the top of one of Mother's lemon meringue pies! But when it hits an oil fire—unlike one of Mother's pies—it cuts the burning oil from the air, denies it oxygen, and the fire is literally smothered by the foam.

One peculiar accessory carried by the *Firefighter* is a set of pavement breakers. You have seen men working in the streets using them to cut openings in the cement or asphalt. They resemble compressed-air drills and on the *Firefighter* they are used to break through the cement floors of the piers so that water can be brought to play against burning piles under the deck of the piers.

Fighting close to great fires as she must, the *Firefighter* is equipped with a fine ventilating system so

that smoke and gas cannot force her crew back from their position. She has an air-purifying system and supplies of oxygen to renew the air under such conditions.

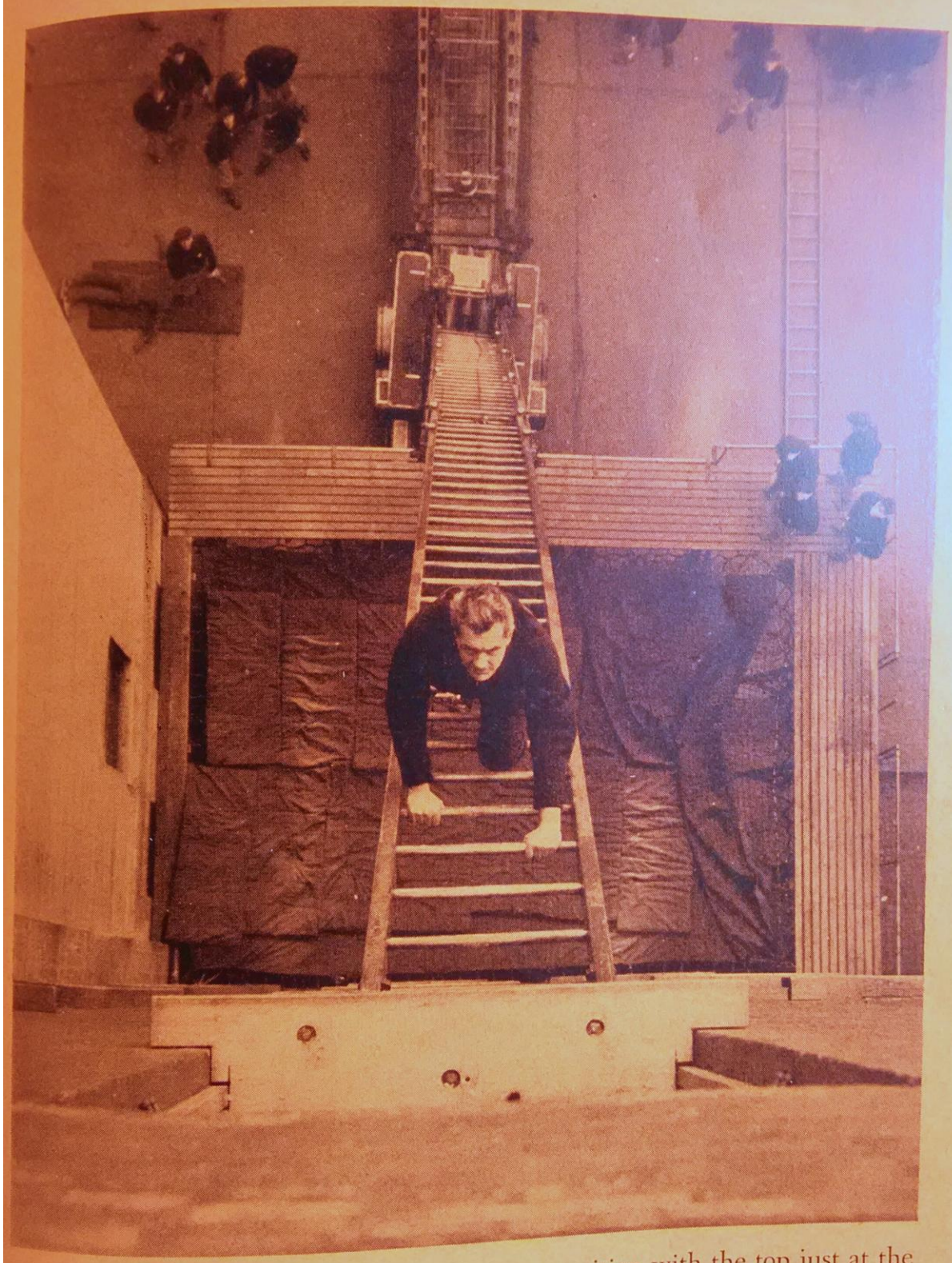
The gloom of night is dispelled by five one-thousand-candlepower floodlights and a million-and-one-half-candlepower searchlight. The noise of a great fire is overcome by the loud-speaker system to every part of the boat so that orders can be instantly transmitted and heard above the din of crashing walls and hissing flames.

Aboard her is a "baby" Firefighter, a launch with a gasoline engine and a seventy-five-gallon-a-minute pump so that the crew can reach small fires under the piers. Smoke ejectors—a form of ventilating fan with great flexible pipes—draw the smoke from burning holds of vessels or force fresh air into their depths.

Every possible contingency is taken care of, for the *Firefighter* is the result of years of experience on the part of the New York City Fire Department and it is a tribute to the Department that she is acknowledged as the finest piece of equipment of her kind in the world.

The crew of a hook and ladder truck swinging the aerial into position to raise against a high window as the author climbs. (Milton Photos)

Now we have reached the top and the ladder still swings for the building as Chief Ryan (lower right) directs the crew. (Milton Photos)



The eighty-five foot aerial ladder swings into position with the top just at the window sill and the author has easy access to the window. (Milton Photos)

A close-up of a deck pipe in action. Note the size of the stream thrown. (Courtesy Fire College, N.Y.F.D.)

FIREMEN IN THE MAKING—THE PROBATIONARY SCHOOL

We See a "Rookie" Fireman Make a Thrilling Rescue—Visit the School That Has Given Him the Training to Make It Possible—We Climb the Sides of Buildings—Jump Into Life Nets—Follow a Probationary Fireman As He Receives His Training.

BILLOWING clouds of smoke hang over a New York City tenement as the top stories of the building melt under a fierce fire. Clanging bells and howling sirens mark the arrival of the Fire Department—unit after unit draws up in front of the burning building. Lines of hose are strung from near-by Pumpers stationed at the hydrants; great hook and ladder trucks maneuver in vain to place their aerial ladders—obstructions prevent them. A dense crowd blocks the streets and gazes aloft at the fire with the usual avid interest of the spectator at any tragic accident or event.

Suddenly there is a shout and a groan from the crowd. Myriad hands point to a window on the seventh story of the burning building. Flame and smoke come in torrents from that seventh story for here the fire is centered and the window frames the form of an eld-

erly woman, half hidden in the choking vapor. Weakly she raises her arms, pleads for rescue and then collapses in an inert bundle across the window sill.

The crowd holds its breath. If she regains consciousness and moves, her body will come hurtling down to the hard pavement seven stories below. Over her head pour smoke and flame. No long aerial ladders can reach her, for the elevated structure prevents the crews from bringing their ladders into play. It seems hopeless. The woman appears to be doomed and the horror-struck crowd await her end. But not the New York Fire Department!

A fireman dashes into the building and shortly afterward appears at a window of the fifth floor. Above him is bare wall, offering no hand-hold for climbing to the rescue. Below is a distance of over fifty feet ending in the cement sidewalk. What can he hope to do to save that woman? The crowd wonders.

The fireman thrusts a long hooked wooden pole out of the window and the crowd notice that it has evenly spaced pieces of wood across it like the rungs of a ladder. On the end, the long hook, set at right angles to the pole, is a sharp metal claw and down the length of the hook are metal teeth to grip and hold against

slipping. The pieces of wood across the pole are rungs, for this is a scaling ladder, designed and used for just such purposes as this which he is now going to attempt although it seems impossible.

The fireman straddles the window sill and out comes the scaling ladder, its long hook parallel to the wall of the building and held close against it so that the ladder will not overbalance the man. It reaches to the next floor above, swings out, the hook turns in towards the window and then the fireman drives it forcefully through the panes of the window. He draws down on the ladder, sets the teeth on the hook, jerks the ladder to make sure that it is firmly in place, and then he stands on the window sill, grasps the rungs and swarms aloft to the sixth story.

For a moment he hesitates at the sixth story as he crashes in the glass of the window, releases the catch and slides the lower part upward. Then his legs straddle the sill, he catches the great hooked end of his flimsy ladder, hoists it upward hand over hand and carefully sets the hook into the window beside the inert form of the woman above.

Out he comes, stands on the sill, grasps the ladder and then swarms upward as a cheer goes up from the

crowd. But the firemen in the street are tense. They know that the hardest part of his attempt is ahead. Watch!

The fireman gains the window sill beside the woman. He chokes and coughs in the smoke. Heat and flame beat on his face. His hands slap out flaming pieces of cloth on the woman's dress. He swings into the room, legs astride the sill, and then he disappears. A groan goes up from the crowd as the woman's body slips out of sight into the room. Both are gone! Then a rousing cheer breaks out as the fireman appears again and over his shoulder is the limp form of the woman.

Carefully he gains the sill, balances, grasps the hook of the scaling ladder, slides a foot down and gropes for the rungs. His foot is placed, the other follows and steadily he descends the thin strip of ladder, nearly seventy feet above the cement, but he nevers wavers, loses his balance or hesitates. Down he comes opposite the sixth-story window where all is clear. For a moment he stands on the sill, clinging to the ladder. Then he gets one leg inside the room, turns and lowers the woman to the floor—safe!

A gallant rescue, one of which the Department is proud but it is only one of many such; the records are filled with similar deeds of great courage and personal

risk. But—this particular fireman had been in the Department less than two years. He was still considered a "rookie"! Yet he acted with all the skill of a veteran. And the answer is that he, as all the men now entering the force must, had been graduated from the Department's Fire School.

The Training School of the New York City Fire Department is a model for other departments, and men from all over our country, as well as other countries, attend this school yearly, so that they may take back with them the training and system that turns out such fine material. Set up by Commissioner John J. McElligott, recognized throughout the world as one of the ablest of fire-fighters and the man responsible for a great many of the improvements in the New York City Fire Department, the Training School is under the direct supervision of Chief D. J. Oliver, a veteran of wide experience and one of the most decorated men in the Department. He has won nearly every medal for valor that the Department awards. But his greatest asset is his ability to train raw recruits, to take them and under the direction of his competent staff whip them into firemen in the incredibly short time of sixty days. Upon this veteran officer Commissioner McElligott depends for the efficiency of the

newer men added to the Department in late years and they have proven their mettle by winning a majority of the rewards for valor.

When the applicant first determines that he wants to become a member of the Fire Department, he must take the Civil Service examination. Four responsible citizens must vouch for his character. Then he faces competitive examinations. During the last examinations there were 28,000 applicants, each required to answer some one hundred and fifty questions as well as undergo a thorough physical examination. Their ages were from twenty and one-half years to twenty-nine, which are the limits. Twenty thousand were dropped! Only eight thousand survived and were placed upon the eligible list which expires at the end of four years. This means that the lower half of them, some four thousand, will never be reached, for the demand will not be sufficient. Of the four thousand remaining some ten per cent fail to pass the special physical examination of the Fire Board. Ten doctors go over the men minutely.

The eligibles wait and when the Commissioner informs the Civil Service that he can add some men to the rolls of the Fire Department, the applicants are given another physical examination as well as a

mental examination. Forty per cent of the total marks in the examination are awarded for the physical condition of the applicant and sixty per cent for the mental examination. Upon the final mark and standing he is rated and listed numerically. As the men are needed they are drawn from the top of the list. Having passed all of these hurdles, the applicant is ordered to report to the Fire School. As can be readily appreciated from the foregoing, he is a picked man. Only some fifteen hundred to two thousand men survive out of over twenty-eight thousand starters!

The applicant is appointed a Probationary Un-uniformed Fireman and assigned to a fire house by Commissioner McElligott. At the same time he reports to the School. The first day he reports he is photographed for the records, told what training uniform to buy and given a numbered badge which is the same as the fireman's badge with the exception that it carries the word Probationary. Now he starts his sixty days of intensive training.

At nine in the morning he reports to the School for inspection and roll call. He must not be late. Nor can he afford to be lax, for any charge against him during these sixty days of training and the thirty additional days that he spends as a probationary fireman,

means that he is automatically dropped under Special Orders number 59. He must be on the mark and alert. The Fire Department deals in saving human life and property, and there is no place for the sluggard.

At first the Probationary man is given military drill. This has a twofold purpose. It permits the officers moving the men in large formations and at the same time it helps to instill discipline. With his drill the new man is acquainted with the workings of the Fire Department. He is taken into large lecture rooms where all of the various pieces of equipment used by the Department are on exhibition. He handles each, learns its name and its uses. Before he leaves the School he will have actually used each piece of equipment.

There is a large enclosed yard at the school and here the training centers. The men are taught to couple hose, carry it aloft on ladders, stretch it from the source of the water supply to the fire, and drag it up fire escapes so that stairways are left clear.

He uses various types of nozzles, learns of the special uses of basement pipes, queer nozzles on long stems that can be thrust into a basement and operated from the street level. Here he also learns the importance of slowly opening and closing a nozzle so

that there is no back pressure generated to rupture the hose or damage the pump. This force may cause him injury for it can easily throw him from a ladder or whip the nozzle from his control and allow the hose to snap around like an angry snake. A blow from a fire hose under pressure is sufficient easily to break a limb or cause very serious injury.

The recruit is shown the reason for the sparing use of water at fires unless it is absolutely necessary to flood the fire. Water damage to buildings and their contents cannot be avoided but it can be kept to a minimum and the Department does its best to reduce the inevitable damage by water. All through his training he is cautioned about preventing damage, and it is a matter of pride with the Department that their record of Fire Damage and Loss shows a yearly decline.

Safety of the fireman is also stressed. At the school where some one thousand seven hundred new and raw men pass through yearly and are trained in this hazardous profession of fighting fire, there has yet to be a fatal, much less very serious, accident. It speaks well for the efficiency and alertness of the staff.

Here the recruit is given his first lessons in the use of standpipes, which we followed in the chapter on

the Engine Companies. The minute details of his work at the school we will see in other chapters. So let us now watch the more spectacular parts of his training. Let us watch a class climbing up the six-story side of the school with scaling ladders.

The men are taught to place their ladders as we saw the gallant fireman do in the first of this chapter. But, unlike his procedure, these men climb story by story at first up a chain of ladders. Every few rungs they must stop, fasten a safety belt that is strapped around their waist and then, with arms widespread and feet close together on the narrow rungs of the scaling ladder, they must lean far backwards free from the ladder and the wall, depending only upon their safety belts to hold them. Of course the belts are tested thoroughly and as a matter of fact can support a weight of twelve hundred pounds. But the very fact that the men must depend upon them during this part of their training gives them confidence in their use.

The use of the scaling ladder enters into many rescues where, due to obstacles, it is not possible to erect other ladders. Of course, an aerial ladder can be raised and placed in position much more readily than a man can scale the side of a building with a

scaling ladder or "pompier" as they are technically known.

The ladder, when used at first, sways rather alarmingly from side to side and is all too pliable for the mental comfort of the user. The author speaks from experience, for Chief Oliver and Captain Kelly sent him up the side of the building on scaling ladders. The climb is made chiefly with the drive of the legs and one is cautioned not to use the hands and arms to try to pull the body up the ladder, for the hands lose their grip and a serious fall may result. The experience is exhilarating although rather severe for one not in good physical training.

After mounting the wall several times on the chain of scaling ladders already placed in position, the men are next trained to go up three floors carrying their ladder with them as the fireman did in the rescue he watched. This is continued until the entire class are able to scale the six floors and mount onto the roof. One interesting thing is to watch the men as they acquire confidence from using the ladders. Soon they are as agile as monkeys, scaling the wall and thinking nothing of it. They even stage impromptu races up the wall!

Another spectacular and important side of the

training is the use of life nets. These are in reality not nets in the strict sense of the word for they are disks of canvas some twelve feet in diameter or more and suspended upon springs around the edges of a metal rim which is held by the crew.

A small platform is built onto the fire escape up the side of the school and here the men learn to jump into the nets. The first jump is not high nor does it look high—from the ground. But when one stands on the platform and looks down at the net you pause and wonder why the ground has dropped so far away while you were climbing to the platform. It wasn't that far from below! And the net has shrunken to the size of a pocket handkerchief! You know that you will miss it when you jump! But, like a cold shower, the first is the worst and jumping is not only interesting but exciting. To the fireman it is a matter of life and death, for he never knows when he will have to use this training to save his life if he is trapped in a fire. Although the school does not permit the men to jump from such a height, the staff have dropped a one-hundred-and-fifty-pound dummy from slightly over one hundred feet and caught it in the life net. That is the equivalent of approximately an eight-story fall! The author thoroughly enjoyed his experiences jumping

except for that first disconcerting dropping away of the ground when he had climbed aloft!

While the new man is in the school he must report to a regular company of the Fire Department that he has been assigned to, twice a week from eight in the evening to twelve midnight. Saturday he spends the twenty-four hours at the company and in this manner he is trained in the regular duties at the fire house as well as at the school. Sunday he has to himself but the embryo fireman usually finds it best to study during that time. Of course, fires know no season nor holidays and so the fireman has none during his training. More, he is rated according to how he does his duties, and upon this his success depends. Little allowance is made for the fact that he is probationary while he is in the fire house, except that he has his duties explained to him. If he shirks them there is no excuse. He is through.

The importance of the various types of fire that the fireman encounters is stressed in the school. Modern civilization has added to the hazards of the fireman by producing countless new and synthetic products which, if burned, give off gases that are highly poisonous. Oil, grease, gasoline, lumber in stacks, all

these present special problems that are taken up at the School.

In addition to this, the danger of water at certain types of fires is drawn to the young student's attention. To the layman the more water the better, it seems, but to the experienced fireman water constitutes a distinct hazard in some types of fires. Let us stop for a moment and watch one of these fires where water was a hazard and yet had to be used in quantity to drown out the fire.

A warehouse in the Bowery section of New York is afire. In this building are stored great quantities of rags which have been packed into huge bales for shipment and sale to the paper makers and others who use these materials. The fire has gained great headway before the alarm and so the Department is handicapped at the start. They have to use plenty of water and that is the last thing they want to do, for the bales of rags will absorb three times their own weight in water. That means that the normal floor loading of the building can be carried up to a point where the floors cannot support the weight if sufficient water hits the bales.

The fire is raging and there is nothing to be done but to hit it with great quantities of water and hope

for the best. The men are warned to watch for falling floors and walls. Now—

Three men brace themselves against the thrust of a powerful stream of water and fight their way into the building, doggedly battle up the stairs and finally center their fight on the third floor of the building. The smoke is dense and acrid from the burning rags. They gasp, choke and cough, fight for air but cling to their line and play the stream on the fire. Tons of water are pouring into the building from lines of hose all around it. The fire is slowly being overcome. The men edge in further, intent on crushing the last of the fire in front of them.

Unseen and unnoticed, the bales of rags are doing their deadly work and now the weight of water they have absorbed becomes too great for the weakened floors. The men feel a sinking beneath their feet, a slow sagging, and then it speeds up. Timbers crack sharply, the flooring groans, rends and in an instant collapses. Surrounded by bales that weigh hundreds of pounds, they plunge through the floor and drop to the floor below.

The great weight of the floor and its loading crashes onto the second floor and it immediately collapses. Now the combined third and second floors plunge

down on the main floor and carry it with them into the basement. Tons of wet bales cascade down, bricks, windows, portions of the walls and great timbers all join in the crash that is heard for blocks.

In the midst of that debris are the forms of three men. Flames leap high above the wreckage, walls totter, fall and crash down to add their burden on the broken bodies below. The firemen spring in to renew the fight from the street and savagely attack the fire in a vain effort to rescue their comrades. They know that no one can live through that inferno of crashing debris and fire but they make the desperate effort nevertheless.

It is nearly twenty-four hours after the fatal crash when firemen, working in shifts over the debris, recover two of the bodies. The third is still somewhere in those tons of wreckage and they toil on, weariness forgotten, until they find their comrade's body.

Three officers are standing on the wreckage directing the digging for the third body. Like the other firemen present, they are solemn, grim at their grisly task. Beside them stands a broken section of pipe, melted by the fire and mute evidence of the fury that had swept the building. The officers are speaking in low tones.

"We'll be a long time locating him. There are tons of stuff to be sorted here."

"If there had only been some warning of what was coming," one remarks as he shakes his head. "They never had a chance. They're . . . what's that? What's that? Listen!"

He turns and stares at the protruding pipe with unbelieving eyes. The others turn, follow his gaze and look at the pipe, flame-scarred and caked with ash.

Some of the ash falls from the pipe and there is a metallic clang from its hollow length. Again the clang.

"Clang . . . clang . . . clang," sounds from the pipe. At the count of five there is a pause and then the taps begin again. Three this time. Another pause and then two taps. Silence for an instant and in that moment the officers look at each other. 5-3-2! A Fire Department signal! Engine Company Thirty-two, that means. And Engine Company Thirty-two fought that blaze and lost three men when the floors collapsed. The officers dive as one man to the pipe and rap a sharp signal. An agonizing wait of seconds that seem an age and then, weak but firm, comes an answer! And there is but one answer to that! The missing man, the man whom they had thought to be lying dead in

the wreckage, is alive! He has been signaling, trying to attract attention to his plight.

Orders roar out and men come running. The news spreads and the firemen muster to the aid of their trapped comrade. Bricks, broken and charred timbers, sections of wall, pipes and girders block the way. Great burned bales of rags clutter the rest of the debris. But under the drive of the men they are cast aside. A hole deepens, sinks to the basement. There the men are momentarily stopped. A great bale of sodden rags, half burned away, blocks the path to the trapped man.

Hooks and picks tear it away. Then it is lifted clear by main force. The trapped man sees the light of day, the eager faces peering down at him. Willing hands lift him from his crypt between two other bales. He is carried to a waiting ambulance. The men who have rescued him gaze in wonder at the manner in which he had been saved. Two great bales fell to either side of him and a third lodged above his head, resting on the other two. There, protected by the buffers of the rag bales, he had stood up to his chin in water as the basement flooded with the deluge poured into the building to extinguish the fire. And all the while, after he had managed to work loose his knife from

his pocket, he tapped his engine company's signal. Sooner or later someone would hear it and recognize it. Then . . . well, wasn't he freed now? And today he is still a member of the force, active as ever! But small wonder that the school stresses the danger of water loadings on floors!

Ladder work forms an important part of the fireman's activities. In the School he is given ample opportunity to become acquainted with the use of the ladders used in the Department. These ladders range from ten to eighty-five feet in length. The ladders up to fifty feet are considered portable types and those of greater length are mounted on the ladder trucks as "aerials" operated by gears and hydraulic pressure.

The placing of a ladder in position is highly important. It must not be too erect, for then the climber is off balance. At the same time if the ladder is leaned against the wall at too flat an angle it has not the strength it possesses at a sharper angle. It must be placed neither too flat nor too steep. Also, the base must be anchored so that it will not slip. To learn to carry a ladder properly is not so difficult and once the knack is acquired a man can easily walk about with a thirty-five-foot ladder held erect!

The aerial ladders which are operated from trucks

are the longest and their use the most spectacular. These great sectional ladders, made in two parts, the upper being lighter than the lower and called the "fly," are placed to an inch at fires. Practice and skill are essential. The ladder is never placed directly against the building but held about one foot out from the wall. This causes the weight of those on the ladder to bend it and bring it against the wall and at the same time the ladder is far steadier. The "give" it would have if it were against the wall at the start is taken up by the spring under the weight of the load. Yet, only a foot out from the window, it can be easily reached from the inside.

One interesting phase of the ladder work, as mentioned before, is the construction of overhead passes for lines of hose. These are erected over busy streets so that traffic can flow in spite of a fire. A ladder is hoisted erect at either curb and lines led from its top to anchorages near the base of the buildings. Then a third ladder is hoisted between the two. This one lies flat with its ends resting on the rungs of the upright ladders. In this manner a bridge is made for the hose and the cars in the street can pass without damaging the lines of hose.

Gas and gases resulting from burning materials are often deadly in their effects and to protect the firemen from these vapors, masks are used. One type, the McCaa, is highly portable and carries a supply of oxygen for one-half hour. Another McCaa carries a two-hour supply. The Burrell Mask is much larger and is used for general purposes. This mask is carried in every Chief's car and inasmuch as there are two chiefs at every fire, at least two masks are always available. The students receive thorough training in the use of these masks, for when they are used there can be no mistakes made.

Probationary firemen are even trained to use the Lyle Life Gun mentioned before. This gun fires a weight that carries a heavy cod line and is accurate to three-hundred-feet range. By using the Lyle gun it is possible to shoot the light line to a window where men are trapped and then hoist a heavier line up on the light one so that they can descend to safety.

As we watch the various duties of the firemen and see them in action in other chapters there is not a great need to detail all of the training in the school at this point. To do so will lead us into repetition. But from what we have seen of the school we can appre-

ciate how thorough it is, how well the men are trained for their duties and when one stops to consider that all of this training is given to them in the short period of sixty days it makes one wonder how it can be done. But it is—and well done, too!

Needless sacrifice of life and property is caused by false alarms. Never ring an alarm unless you are sure there is a fire. (Courtesy Fire College, N.Y.F.D.)

Interior of a Fire Telegraph Bureau. *From here the alarms are routed to the proper companies.* (Courtesy Fire College, *N.Y.F.D.*)

THE FIRE DEPARTMENT AMBULANCE—A WHEELED HOSPITAL

We Visit Doctor Archer, World-Famous Fire Department Surgeon and Doctor—Examine the Unique Ambulance He Operates. We Hear Some of His Thrilling Experiences—Watch Him at a Fire Where Over One Thousand Firemen Are Injured!

IT WAS a routine matter to the New York City Fire Department for it was not a big fire nor was it an especially difficult one. True, it was a "hot" fire while it lasted but water soon drenched it, snuffed it out. A few of the men suffered from smoke inhalation but again that was routine. When you go into a burning building to open up the windows and roof, ventilate the fire and clear the building so that the fire may be fought more efficiently, it is to be expected that there will be some smoke present and the first men in will probably "eat" their share of it.

The fire was out and the companies had returned to their houses. Hours had passed. Those who had been "smoked" were still on duty but they did not feel particularly well. The effects of the smoke seemed to hang on a bit more than usual. Well, it would

soon pass and then they would be all right. Didn't it always act that way? After all, what was a bit of smoke from time to time? It went with the job!

Then suddenly the picture changed, took on a sinister aspect. A fireman collapsed into unconsciousness. While his comrades worked over him, another man collapsed. Men were dropping like flies and in a mysterious way. There seemed no reason for it. Yet they fell into a coma.

As it always does in an emergency, the Department turned to Honorary Deputy-Chief Archer, Chief Doctor and Medical Consultant of the New York City Fire Department. He was hurriedly summoned from his headquarters on Eighty-third Street. Accompanied by his ever-present aide, Fireman Delaney, the Doctor sped to the scene.

On the way to where the stricken men were lying he wondered as to the cause of their collapse. Mentally he checked the situation. There had been a fire, the men concerned had apparently suffered the ordinary smoke poisoning from inhalation, which was not so serious. But here, in this case, they had suddenly relapsed into unconsciousness hours afterwards. What was the cause of this mysterious thing?

Having made a lifelong study of the medical prob-

lems encountered as a result of firemen's activities, Doctor Archer decided that there must have been nitric acid present in the building and that the fumes from this had caused the collapse of the men.

Upon his arrival at the bedsides of the men his opinion was confirmed. They were undoubtedly suffering from a form of nitrous oxide gas poisoning—which results from nitric acid being exposed to fire. But—here again the mystery deepened.

The Fire Department keeps a careful record of all such substances that are stored in buildings and a permit must be obtained to store materials of dangerous natures. But in this case no permit was in evidence. The material might have been stored there, even so, but evidently it hadn't been. The Battalion Chief reported that the building had been inspected but a short time before the fire and that the whole premises were clear of such materials. At least, none had been found.

Doctor Archer was still sure that nitric acid or one of its derivatives had been present. There was no denying that the men were suffering from nitrous oxide fumes. He had treated them for that and even now they were beginning to recover. He went to the Fire Marshal.

The smoldering ruins were examined in detail. There was no acid present nor anything that would demand nitric acid in its manufacture. Whence then, came the nitrous oxide fumes that had overcome the men? Doctor Archer started to examine the materials in the building.

On one of the floors was a concern that manufactured heels for ladies' shoes. Doctor Archer picked up one of the heels and examined it. Fire had touched the heel and the shiny material that resembled patent leather was burnt away. Rummaging around through the debris soon disclosed a box of the heels that were untouched by the flames. He opened it.

Inside were shining black ladies' heels of the type commonly known as "French heels"—high narrow heels that only a woman could or would wear. The black material that decorated the outsides of the heel was intact, covering the wooden interior.

"Here's where our nitrous oxide came from," he announced. "It came from these heels and they are what felled the men. They are a distinct menace to any fireman who enters a building where they are burning. We'll have to list them on our dangerous lists."

The fire officials were somewhat skeptical but—they

knew Doctor Archer and knew that he never spoke unless he was sure of what he said. He sensed their doubt.

"Have one of them analyzed," he suggested.

The Fire Marshal did so. It proved to be made of celluloid which is nitro-cellulose and when burned gives forth large quantities of nitrous oxide fumes, much the same as does motion-picture film. Yet, thanks to the study of its effects that Doctor Archer had made and the fact that he is in command of the only ambulance of its kind in the world, the men's lives were saved and today they are as well as ever. Let us examine this unique ambulance and see how it is used in the New York City Fire Department.

The ambulance is much larger than the ordinary vehicles of that type. It is really a small hospital on wheels! To best watch this piece of apparatus in action, suppose we follow it to a fire in a storage warehouse on the Long Island waterfront.

It is a bad fire, one at which there are vast quantities of smoke and gas. The fire is in huge bales of rags, cottons and woolens as well as paper that are stored in a gigantic building. When we arrive at the fire it has already been burning for more than twenty-

four hours and still the fire companies are fighting their way into the building to get at the heart of the flames.

We pass through the tightly drawn fire lines where police restrain the crowds and make our way down the street in front of the building. For a time we watch the firemen battling the flames. Smoke billows out of the windows and there is a peculiar lack of flame. It is one of those smoldering fires that are so hard to extinguish, for the men must move most of the material or thoroughly drench it to stop the slow progress of the fire. And all this smoke means that there is going to be trouble. We soon see the results.

Near the building and away from the apparatus is a tall staff carrying on its top an arm some four or five feet in length and set at right angles to the staff. From the staff and arm drops a bright red flag lettered in gold. It marks the first-aid station of the Fire Department and here is located Doctor Archer and his famous ambulance. We will disregard the other ambulances there and watch that of Doctor Archer, for his is the one we are interested in and the one that carries so many special appliances.

Men are being overcome from the smoke in the interior of the building. Their comrades lead them to

the first-aid station. Near the ambulance is what seems at first glance a dormitory. Twenty-five army cots are set up and covered with blankets. In them are twenty-five firemen suffering from smoke inhalation and minor injuries. We learn that every one of those twenty-five cots and blankets came from the ambulance where they are carried in a special compartment along the right side of the running board. And each patient is fitted with a Navy-type woolen cap! They too come from the ambulance. We comment upon this unusual equipment to Doctor Archer.

"That is but a part of the equipment we carry for just such emergencies as we now have here," he tells us. "We have five stretchers, two adjustable hospital beds and many more things stored away in the ambulance. We'll need them if this keeps up. I don't like it at all."

We learn that at a previous fire the ambulance treated three hundred and five men and established a record for such service. But it is not just a matter of pride with the Doctor, for his heart and soul are tied up in the Department and he hates to see the men injured. This love for the service is shown best, perhaps, by two gold buttons that decorate his left cuff. They represent two medals for bravery—twice has he

entered burning buildings at great risk to his own life in order that he might aid others.

This fire we are watching is going to establish yet another record of service by the ambulance, for by the time it is extinguished it will have burnt for three days and nights and Doctor Archer will have treated exactly *one thousand and forty-six men!*

As we stand watching, a man comes for aid. He has been burnt rather badly on the face and hands and is in great pain. Now we see the Doctor spring into action and observe the latest technique in the treatment of burns.

The man is given something to ease his pain and then the burnt tissue is cleaned away. Next the Doctor takes a spray and thoroughly sprays the burnt areas. Gauze that is dampened with the same material as the spray, is applied to the burns and then bandaged in place and the man sent to a hospital.

"New treatment, that, tannic acid treatment," Doctor Archer announces to us. "Very effective. You see, tannic acid is the acid used to tan leathers. In burns, the skin and tissue are very soft. The tannic acid hardens this tissue and makes it firm. We spray a weakened solution of the acid on the affected parts and then cover them with five per cent tannic acid

solution mixed in ordinary petroleum jelly. That keeps the scar tissue soft and helps subsequent dressings. By removing the burnt tissue we avoid septic conditions and the burns heal rapidly, leaving few scars afterwards."

There is a momentary lull and the Doctor has a moment to devote to us.

"Come on, I'll show you the inside of the ambulance." He is obviously proud of it and he should be. The rear doors are open and we peer inside. To right and left are the two adjustable hospital beds and beneath the sections they rest upon are drawers which hold a supply of materials. We notice that each drawer is labeled and has a list of exactly what it contains printed on the board at its end.

"Everything in here is labeled and in its place. If you can read and understand English you can find anything in here in a moment," the Doctor announces. "Everything has a place and is in it, too!" he adds.

"Now, look up forward there at the end of the compartment right by the partition between this part of the body and the driver's compartment. See that enamel table slung down from the wall? And the bottles above it? That's my dressing table. Just like

those used in hospitals. I can treat injured men there and I have everything right at hand for the job. Antiseptics, gauze, bandages, splints, everything is handy in those drawers you see beside it and the additional supplies of medicines are in the cabinet above the table if they are needed.

"Those wall sockets that you see are for the electrical appliances we carry—heating pads and the like. We have a generator on the engine and it delivers the ordinary 110-volt current to us right here in the ambulance. It also runs the hot water heater and the sterilizer. I can get boiling water in two or three minutes with it.

"Now, here's something that might be of interest to your readers. They may have noted that lately all men are carefully carried off football fields when they are injured. They don't let them walk off or droop from the shoulders of two other players any more. They put them on a stretcher. Well, it's a matter of protection for the injured man. We follow the same procedure with our men. If we suspect a back injury we never permit men to lift him by the feet and shoulders as they used to do. Here's why:

"If a man's vertebra is broken and you lift him by the feet and shoulders he 'jackknifes,' that is, folds

sharply at the hips. This folding will cause the broken vertebra to pinch the spinal cord and injure it. The moment that happens, of course, it means that the man is paralyzed from that point on down for the rest of his life.

"Fireman Delaney has invented a special device to lift men suspected of having back injuries and we carry them in the ambulance."

The Doctor reaches into a lower drawer and takes out a wide and heavy metal strap some eight inches across and about three feet long. It is chromium-plated and has a hand-hold at either end.

"We just leave the man where he is and then slip this lifting device under the small of his back. Then we have men lift him. Two men lift the shoulders, two the middle by means of this metal strap and two others lift the lower limbs. In this way there is no additional injury to his back. Only just a while back we suspected a man might have such an injury and used this device. Subsequent X-rays showed him to have a broken vertebra but he recovered, thanks to this device."

We ask Doctor Archer if he has other similar new devices in the ambulance.

"Oh, yes indeed!" he exclaims. "Fireman Delaney

has invented a number of most useful things. One is a special splint that holds broken legs in place and is adjustable to either leg. Before he invented it we had to carry a splint for right legs and another for the left. His takes care of both. In addition, it is constructed of wood so that we can make X-rays with the splint in position and not have it block out a portion of the negative as a metal splint does.

"Ever try to free a man from an electrical wire heavily charged?" the Doctor asks us. We admit we have not nor would we face the prospect with a great degree of confidence.

"Well, we have a simple way of handling them," he tells us and goes to yet another compartment of this ambulance that seems made up of such places. "Here," he says, as he withdraws a formidable-looking tool. It is a long wooden pole made up of two pieces of wood which clamp together with a slide of heavy insulation. On its end is an adjustable bright steel hook.

"If the wire is easily reached as when it lies across a man we just fasten onto it with these wooden tongs and remove it," he says. "But if the wire is beneath the body then we use the steel hook and catch the man's boots or his clothing and drag him clear. The

handle is insulated so that even twenty thousand volts will not touch us. Handy tool, this!"

There is an interruption as another man is carried to the Doctor. This fireman has "eaten too much smoke"—he has fought the blaze in the warehouse and during his stay in the building the choking gas has overcome him. He is unconscious.

"Inhalator!" snaps Doctor Archer. The rubber mask is placed on the man's face while another man applies artificial respiration. The Doctor adjusts the flow of oxygen and carbon dioxide through the mask. Shortly afterwards, the man begins to breathe of his own accord again and soon is placed on one of the cots that has been emptied.

"That treatment seemed very effective," we suggest, angling for an experience of the Doctor's.

"It is," he states. "That young man will be pretty sick for a short time but he will get over it. He came around quickly. We worked on one man for fifty hours and thirty-two minutes before we saved him!"

It did not seem possible, yet we knew that it was the truth. Fifty hours and thirty-two minutes! Then we ask how that came about.

"One of our men was overcome and his heart went bad. We succeeded in getting it working again but

every time we did, it would fail. So we kept at it until it finally decided to run normally. Took a crew working in shifts at artificial respiration to do it but we did it. Through that and the inhalator he came around all right eventually."

A crew working in shifts at artificial respiration, but nothing said of a doctor there for fifty hours and thirty-two minutes supervising the saving of that man's life!

"We had a rather unusual case once," the Doctor continues. "We received a call from one of the largest of the New York Hospitals. It seems that they had a patient—a boy—who was slowly dying. He had been struck by an automobile but apparently suffered no injury. At least it did not show at the time. But later he became unconscious and was rushed to the hospital.

"We were called to see what we could do to save him as his respiration was gradually becoming less and less. He was breathing about three to four times a minute when we arrived. I promptly called for a rescue crew to apply artificial respiration and we placed one of the inhalators we carry, on the boy in the meantime.

"I diagnosed the case as a concussion and internal hemorrhage and the House Surgeon concurred in it. With the arrival of the rescue squad and the application of artificial respiration we stepped up the boy's

To build confidence, probationary firemen are required to "hook on" to the scaling ladder as the author is doing and then lean back so that the body is supported only by the belt. (Milton Photos)

The hooked end is caught over the window sill by thrusting the ladder up from the window below. By repeating the process any number of stories may be scaled if the user's strength lasts. (Milton Photos)

A section of the training center where the firemen are instructed on the use of motors and pumps. (Courtesy Fire College, N.Y.F.D.)

breathing but he was in very serious condition. Something had to be done quickly.

"'We will have to operate but I cannot operate here and how can we get him to the operating room?' the House Surgeon asked.

"'We'll get him there. Leave it to us!' I told him and directed the rescue crew to carry the hospital table on which the boy lay, into the operating room.

"There was a man astride the boy applying artificial respiration at the time and he stayed there while the rest of the men carried the entire outfit bodily into the other room. The fireman working on the boy never missed a beat of his respiration, either! Others took care of the inhalator during the trip and it never ceased to function. Finally we had the boy on the operating table and then another problem arose.

"We could not afford possibilities of infection from our breath or clothing so all must be dressed in sterile clothes. While the crew changed, some of them remained and kept the boy's heart and breathing going. Then the crew returned dressed in long white surgical robes, sterile shoes and with masks over their faces. They got quite a kick out of it. But the worst was yet to come.

"It was necessary to open that boy's skull and re-

lieve the pressure of the blood on his brain. That was causing him to cease breathing by paralyzing a part of the brain. Yet we could not stop the respiration nor the inhalator while this delicate operation was performed.

"Men held the boy firmly. Others stood by. One was astride the boy applying artificial respiration and others held the inhalator in place. The surgeon and I operated.

"The outcome was that the scalp was laid back, the skull exposed and then an opening made that permitted the blood to escape and relieve the pressure. The moment it was relieved the boy began to breathe normally. Today he is a healthy growing boy!"

"That was a remarkable operation, Doctor," we remark. "About as unique as they come, wasn't it?"

"I wouldn't say so," he replies. We wonder what could be stranger, and ask him.

"Well," he begins, "we had a bad building collapse some time ago on Mosholu Parkway!"

A man was pinned in the wreckage and the only way to get him out in time to save his life was to amputate his leg. Without a proper kit to perform this operation, it was difficult. And strangely enough the same thing happened in a subway accident some

time later. We performed the operation successfully in both cases but it was most difficult."

We could imagine that, when we tried to picture a doctor working in the wreckage where a man was pinned in.

"The Mayor, Fiorello LaGuardia, happened to be present both times. He saw our difficulties and appreciated them. Here's the results—as you would expect if you know the Mayor!"

The Doctor delved into yet another drawer and brought out an engraved metal case. In it was a complete amputating set!

We glance at the men who have been knocked out by the smoke. They are recovering rapidly. Our mind turns to this effect of smoke and we realize that now is a good time to ask about smoke and gas at fires for Doctor Archer is a recognized world authority on the subject.

"What about smoke and gas at fires, Doctor?" we ask.

"Well, of course, there's always smoke at a fire!" he laughs. Then his face is serious as he thinks of the results of too much smoke. "But it is gas that is the worst," he continues. "You see, smoke alone is bad but a man has a chance. With some of the gases there

is none, for the man does not realize he is gassed until it is too late."

"Gas?" we ask, wondering.

"Yes, gas, poison gas too!" he answers. "You see, fires these days are in all sorts of materials and many of them give off poisonous gases when they burn. Now, to the layman, silk is a harmless material. But to a fireman it can easily be deadly! It is this way:

"Burning silk or rayon gives off one of the deadliest gases known to man when it is sufficiently hot. One of the products of burning rayon is hydrocyanic acid gas, the identical gas that is used in lethal chambers to execute criminals.

"When large quantities of this material are burning the resulting mixture of smoke and gas can be very deadly in the close space of a building. Silk of this kind is stored in large quantities in some districts and we take special precautions in fighting fires where it is present. The rescue squads who are equipped with gas masks are the only ones permitted into the building where the fire is.

"In one hundred cubic feet of the product of this combustion there is present 12.3 cubic feet of hydrocyanic acid gas, 55 cubic feet of ammonia gas, 5 cubic feet of carbon monoxide—which is very deadly too—

and other gases. The ammonia camouflages the taint of the hydrocyanic acid gas and makes this sort of a fire doubly dangerous. Hydrocyanic acid gas alone smells somewhat like the odor of peach pits but nobody ever smelled much of it, for a very very little of it is sufficient to cause instant death. So you can see we must watch where the fire is and what is burning.

"Now wool is a seemingly harmless substance but when it burns in quantities in a close space it is deadly. It too produces hydrocyanic acid gas and has a high volume of methane gas which is very deadly. Rubber is another substance that gives out poisonous gases, especially rubber insulation. Silk, wool, rubber, paper, wood and gasoline are the bad actors in order of their mention. Strangely, if it were not for its explosive qualities, gasoline is the least dangerous of all the fires! Yet it is feared the most by the layman!"

We think back about the nitrous oxide gas for which the Doctor treated the men after the fire where the women's heels were involved.

"How does that affect a person, Doctor?" we ask.

"Very peculiarly," he explains. "You see, we have a sort of a valve over the entrance to the windpipe in the throat. When we breath, this little valve opens and the air passes down the windpipe. When we swal-

low, the valve closes so that no food or drink can enter the lungs. Now, when nitrous oxide gas is inhaled, the gas mixes with the moisture on the valve and forms an acid. This attacks the delicate membrane of the valve and causes it to swell. After a time the valve is so swollen that it sticks closed and the breath is cut off. Nor can you breathe no matter how hard you try. You are due to die of suffocation unless some drastic measures are taken."

He chuckles as he recalls an incident.

"Had a peculiar thing happen in connection with this very thing," he states. "We had a subway fire and there was quite a bit of nitrous oxide gas present in the smoke. It affected a young lady. She collapsed on the platform of one of the stations. Nervous tension made it worse as she was hysterical. Then she began to suffocate. The valve we have been speaking about had stuck in the closed position. We did the only thing we could do to save her life."

"What was that, Doctor?" we demand, thoroughly interested. The Doctor smiles and quietly says—

"Why, I cut her throat!"

"What! You cut her throat?" we exclaim.

"Surely!" he responds, quite casually.

We stare our disbelief and he chuckles.

"Don't take it so seriously," he advises. "You see there is but one thing to do and that is to cut the patient's throat. You make an opening in the throat near what is commonly known as the 'Adam's Apple.' A small opening there permits the patient to breath. Then you can treat the 'valve' above and reduce the swelling. As soon as it is reduced—a matter of some time—it begins to function again and the patient starts breathing in a normal manner. Of course, then you close the emergency opening you have made. In this particular case I am glad to say that the young lady survived and other than for a very small scar which you would hardly notice she had no marks to show for her experience."

Emergency operations in subways, in wrecked buildings, in the crumpled steel cab of a subway train, in burning edifices! Where didn't the Fire Department Doctor and ambulance go!

"Oh, we get down into holes and sewers and all sorts of places," Doctor Archer tells us. "Here, we have a special harness to hoist out bodies from such holes."

He goes to another of the innumerable compartments and removes a harness that fits over the head and shoulders, strapping around in such a way that

the body can be easily hoisted out of cramped quarters to the surface. Just another of the innumerable things carried in this unique ambulance.

There is a surge of smoke and flame from the burning building and the Doctor looks up.

"That looks bad. I'm afraid some of the boys may be needing us soon. I hope not. But I'd better be ready."

We leave the ambulance and Doctor Archer with the hope that he will not be needed but from what we have seen we know that if he is needed—everything will be there and ready.

THE RESCUE COMPANIES—"SPECIALISTS IN LIFESAVING"

CHAPTER IX

THE RESCUE COMPANIES—"SPECIALISTS IN LIFESAVING"

We Visit Rescue Company Number One—Watch It in Action—Learn of Its Many Duties and Exciting Deeds—Examine the Truck and the Many Interesting Pieces of Equipment It Carries.

Housed on the lower West Side of Manhattan Island is Rescue Company Number One of the New York Fire Department. This, the first rescue company ever to be organized in the Department, had for its first company commander and originator a Captain John J. McElligott. He was and is a strapping great figure of a man, fearless and proven as one of the really great fire-fighters, a rare combination of brains and brawn. Today this same Captain is the Honorable John J. McElligott, Chief of the Uniformed Forces and Commissioner of the New York City Fire Department.

Let us follow this famous rescue company as it responds to a call of fire. Hang on! We are "rolling" with Rescue Company Number One!

We swing out of the wide door of the fire house and turn to the left towards the Hudson River. Soon

we are at West Street, a wide thoroughfare that bounds the western limits of Manhattan Island in the lower section. Up West Street we roll, weaving through traffic. Far ahead we can see an ugly column of smoke. There is our fire! It is along the waterfront.

We turn under the West Side Elevated Highway, that street above a street that relieves some of New York's traffic, and now we are running along the fronts of the great piers where vessels from all the corners of the earth dock. We see fire apparatus clustered in front of a great shed and from the far side the smoke pours out in huge clouds. Our truck grinds to a stop near the entrance to the pier.

A vessel is on fire. Flames are sweeping the hold and this particular boat is designed to carry refrigerated meats. That means that it is equipped with a great system of refrigeration and that there is apt to be ammonia gas flooding the hold as well as smoke. The wind veers for an instant and the sharp acrid smell of ammonia attacks our nostrils and eyes.

Now we understand why the firemen on the pier are crying! And why they are not in the hold of the vessel fighting the flames. The gas has driven them out and now it is the job of the rescue company to enter the hold and attack the fire at its source.

Trained to the use of masks and equipped with three distinct types, the crew can cope with any conditions of smoke or gas. Out come the Draeger helmets, large black leather helmets with a circular plate of glass in the face like that of a diver's helmet. A large tube leads to a bag on the chest and other tubes lead from the bag to a metal flask carried on the small of the back.

This flask supplies oxygen to the wearer and the tubing passes the air through a container that removes the carbon dioxide exhaled by the user. Thus, by renewing the oxygen and removing the carbon dioxide, the user of the mask can breath in any atmosphere as long as the flask of oxygen feeds its life-giving fluid. Several hours' supply is carried in the small cylinder, for the gas is compressed under two thousand pounds pressure.

The rescue company crew take charge of the lines of hose and drag them into the interior of the burning hold. Impervious to the ammonia fumes and smoke, they charge in on the fire. It is but a matter of minutes until the volume of smoke begins to lessen, the black turns to gray and then only thin wisps of smoke curl from the hatchways. The fire is out.

Still using their masks, the crew set about stopping

the ammonia leaks so that others can enter the hold and repair the damage. Temporary repairs are quickly effected and then the rescue company rolls back to the fire house.

They are not there long when there is another call. This time it takes them to the East Side of the city. There has been an explosion. We remain at the house and then wonder at the crew when they return. They are all grinning and laughing. We ask why.

"One of the funniest things you ever saw!" an officer explains. "There was a junk truck loading some refuse from a chemical house. He didn't know what the stuff was but he bought it cheap and figured that he could sell it somewhere. Well, he started to load it into his truck. He just dumped it in on the rest of the stuff in the body of the truck. Then he started to go around to the driver's seat.

"He didn't get there. There was some chemical reaction between the stuff in the truck and the load he had just dumped into it. It all went off with a terrible bang! There was a cloud of dust, a few broken windows, no one hurt, fortunately, and a scared junk driver! And we made a run for ten cents worth of fire!"

"You must get some peculiar calls," we state, try-

ing to get the officer to relate some of his experiences.

"Well," he drawls, "of course, you never know what you are heading into in this job. Not with a rescue company. You see, we respond to certain alarms and as well as that we can be called to any part of the city on what is known as 'special calls.' Let's look over the equipment on the truck and that will give you an idea of what we are called upon to do."

We walk to where the truck waits by the door and examine the contents.

"The crew of a Rescue Company are all picked men," the officer tells us. "You see, we have to be specially trained in the uses of masks, cutting tools and torches, jacks, inhalators and many other things. Speaking of the masks, they are heavy and in time become very tiresome to carry. Also, a man is under severe strain at times in this work so that all of the crew must pass a very strict physical examination before they can qualify for the company. We usually try to pick experienced firemen from ladder and engine companies, for at bad fires where there is a lot of gas we enter the building with our masks just as we did the vessel. Then the company has to act as an engine company. Or we may be required to replace a ladder company where the fumes are such that unprotected

men could not work. You might say that when others can't—we do! That's not boasting for we are specially equipped and trained. It takes a lot to stop the rest of the firemen but they can't buck gas without a mask.

"Now, let's see what is on the truck. You will notice that we carry about all of the tools that the engine and hook and ladder trucks carry and a lot more. As you have gone over both the other company trucks in detail there is no necessity of repeating the description of the equipment now. Let's take a look at the special stuff we carry and use.

"We carry three different masks. First is the Draeger, a German design used universally for working in gas and fumes. It is a heavy mask as you have seen. It's the type we used at the boat fire.

"Next is a much lighter mask and this type, the Burrell, closely resembles the familiar masks so popular in Europe against war gas-raid scares. It is portable and light but it must be used where there is oxygen present for it does not carry a supply like the Draeger. This mask filters the air of impurities and permits working in light smoke and ammonia fumes. Heavy smoke or ammonia will be too much for it.

"The third type is a very light mask called the McCaa—pronounced as though it were Mackay. We

do not use this mask a great deal but it is handy in light smoke and gas.

"Now, we respond to accident calls where often we find men trapped by girders or in the steel cabs of trucks. We have to pry away the girders or cut them. To do this we use different systems. If it is a big job and it is essential that the man be released as soon as possible as is the case when they are severely injured, we use an acetylene torch. To protect the men we are working to free, we have a large asbestos blanket that prevents burns from the heat and the flying bits of molten metal as we burn away the girder.

"Sometimes we have to work in rather ticklish places where vibration might bring down more of a collapse. There we use an electric saw if we can't burn away the obstructions.

"If we do not want to cut or burn away material trapping a man or blocking entrance we have several jacks. These can be used to lift heavy objects like a subway car. Occasionally someone either falls or jumps in front of a train and we have to remove them. This means lifting the car. To do that we have jacks capable of lifting weights of eighteen tons. We also use them to force apart cabs of trucks.

"We get many calls to oil fires and to fight this

type of fire we carry a Foamite apparatus. This cuts off the air supply to burning oil and smothers the fire. We make our own. This is how we do it. We use a special fitting coupled to our hose lines. Here it is."

The officer takes down a length of pipe that has a container set in its center section. This container is something like the top of a coffee grinder of the type used in stores and the top part is called the hopper. Water rushes past the lower end of the hopper and a powder is placed in the hopper. When this powder mixes with the water it forms a heavy thick foam. One pound of the powder will make eight of Foamite and the truck has a three hundred pound supply of the powder.

An inhalator is carried to resuscitate people overcome by gas or smoke. It is of the same type used in the chapter on the fire department ambulance.

"Just what sort of work does the company do the most?" we ask the officer.

"That's a hard question to answer," he replies. "Of course rescues are the chief function of the company but we are being used more and more at places where there is gas present. This gas may be either ordinary illuminating gas or the product of combustion. Sometimes it is refrigerating gas.

"I believe that Doctor Archer explained to you the gases generated in silk and woolen fires. Now the Department calls on the rescue companies at these fires and we drop our usual duties to act as a hook and ladder or engine company as I have told you. We are protected by masks and so there is no danger of exposing firemen to deadly fumes if we go in there. Thanks to Doctor Archer's researches we know we will have such fumes at certain types of fires and we can take precautions for our own protection."

We glance at the formidable amount of tools for wrecking purposes, the jack, acetylene torches, smoke exhauster equipment, electric saws, masks, heavy bars, long coils of rope and other materials the truck carries. It has everything that all of the other trucks have and more added. It does not seem possible to meet an emergency that this truck and its crew cannot overcome, and so far—they have yet to meet defeat!

"Rescue companies must win many medals for bravery," we state, questioningly.

"Well," the officer smiles, "the boys do get careless with their lives at times when somebody is in a bad spot. They usually get them out safely. But," he adds depreciatingly, "after all, that's our business, isn't it? We're a Rescue Company."

SEARCHLIGHT TRUCK NUMBER ONE–
A PORTABLE POWERHOUSE!

SEARCHLIGHT TRUCK NUMBER ONE—A PORTABLE POWERHOUSE!

A Land Fire Company at a Marine Accident! We Examine the Newest and Oddest Piece of Equipment in the Fire Department—See It in Action—the Searchlight Truck.

A DENSE fog enshrouds the harbor and the air reverberates with the raucous bleating of fog horns. The excursion steamer *Mandalay* creeps through the haze, feeling its way down the channel. Dead ahead a foghorn sounds. Another sounds from directly abeam. The masters of the vessels stand on the bridge and peer intently through the swirling clouds of vapor in a vain attempt to pierce the gloom.

Suddenly, out of the fog, a vague shape materializes. The blurred image rapidly assumes the form of a steamer. Within minutes, in spite of every effort that the commanders make to avoid it, there is a collision. The vessels part again and the *Mandalay*, driven into shallow water by her commander, rapidly sinks until only her upperworks are visible.

Vessels stand by, respond to her distress signals. The crowded decks where excursionists jam the rails, are soon emptied, the passengers taken aboard other

craft. But—are they all safe? Have some leaped into the fog-blanketed water in their first excitement of the collision? Are they still there waiting for rescue? The gloom is so dense and thick that they cannot be seen nor their cries heard over the ceaseless brays of the fog horns. How can they be found if they are there?

Suddenly the enshrouding fog is lightened. It turns from dark gray to white, then whiter still and light plays over the surface of the water. Ashore, a great opalescent glow in the fog marks the source of the light that makes it possible to see if survivors still linger in the water. And, about the last thing one would expect to find present at a marine accident, is a land company of the New York City Fire Department! It is Searchlight Truck Number One from Manhattan.

There are but two of these units in the Department and they are unique in any Fire Department. Truck Number One is a large open body truck with an enclosed cab for the drivers. It is painted the standard bright red of the Fire Department but there all resemblance to what one would commonly associate with the Fire Department ceases. The truck looks more like a piece of circus equipment!

Both sides of the truck are lined with great floodlights and a huge searchlight is mounted in the center

of the body immediately behind the driver's cab. Let us look at these lights. There are nine in all.

The searchlight stands on a pedestal that can be raised and lowered two feet so that the beam of the light will clear the rounded top of the cab. This huge light gives 1,500,000 candlepower! Its beam can be seen at night for miles if it is thrown into the sky. It can light up points on a building from over two miles away. Gears control its movements, swing it right or left, up or down.

Along the sides of the truck are eight more lights, grouped four to the side. These lights are set in sockets but they can be readily removed and placed in other positions if needed there, for they are all of the portable type. Let us watch this unit of the Fire Department at a fire and then we can see why this truck was designed and for what use.

A great warehouse is afire and dusk settles over the city. The street is blocked off where the fire rages. Units of the Fire Department are drawn up along the length of the block and streams of water play into the building. Smoke from the fire boils out of the windows and roof, swirls down into the street. The night is falling fast and the smoke, added to the darkness, makes the scene like one from Dante's Inferno, for the

red flames illumine the sullen clouds of black smoke. Visibility is cut to a few feet, less than one hundred. Then Searchlight Truck Number One appears on the scene and swings into action.

She draws up in the center of the block near the fire. The crew spring to the ground. The lights along the sides of the truck are lifted from their sockets, carried to strategic points and set up on portable tripods. Members of the crew open traps in the lower side of the body of the truck and disclose great reels of heavily insulated and waterproof cable. These are turned and the cable stretched to the lights. Automatically locking and waterproof connections couple the cables to one another for greater length and likewise attach to the lights. The motor of the truck is thrown into gear with the ten kilowatt generator and current surges through the cables. Now lights are placed all along the opposite side of the street from the fire. There are eight of these lights in position along the great warehouse. The ones at the end of the line where their light will have to reach the farthest are equipped with 1000-watt bulbs, the next farthest hold 500-watt bulbs and those immediately opposite the building have 250-watt lights in their reflectors.

An officer of the Searchlight Truck stands at the

rear of the body and swings open a glass door. Behind the door are the switches which control the lights. One by one he snaps them to the "on" position. The deep gloom where men groped their way is instantly dispersed. The frosted anti-glare glass fronts of the floodlights bathe the scene in a brilliant but soft light. The building stands out, the men see without difficulty and the situation is clearly lighted for direction by the officers fighting the fire.

But high on the building smoke hides the view of a squat tower. A Chief shouts to the Searchlight Truck for light on that tower. Around comes the great searchlight, up comes its mounting, gears rotate and it points its face at the tower. There is the snapping of a switch and an intense blue-white light cuts through the night and smoke to make the tower atop the building stand out in every detail!

Later there is a call for electric power. The firemen have fought their way into the building and the fire is under control. But the current to the building has been cut off and innumerable wires melted by the flames or broken by the falling floors and timber. Yet at the rear part of the building there is an elevator which the firemen wish to use. But there is no electrical current available in the building and it rests

there useless. Searchlight Truck Number One goes into action again.

Cable is strung to the electric leads of the elevator motors. The current from the truck pulsates through the windings and the elevator is again in service! The unit can string 2,100 feet of cable to deliver current at any point within about one-half mile from her position.

The unit is just what we have seen it is—really a portable or rather a mobile power station that can supply light or power at a fire wherever it is needed. Although not classed as one of the most important items in the Department it is important and typical of the thoroughness and foresight that enters into the modern fire department in its battle against any contingency that might arise during a fire.

THE TELEGRAPH BUREAU–NERVE CENTER OF THE FIRE DEPARTMENT

CHAPTER XI

THE TELEGRAPH BUREAU—NERVE CENTER OF THE FIRE DEPARTMENT

We Visit the Central Telegraph Bureau Where All the Alarms of Fire in Manhattan Island Are Transmitted. Inspect the Workings of the Bureau and Discover the Incredible Speed With Which the Alarms Are Handled and the Apparatus Responds.

WHO hasn't, at one time or another, felt the urge to pull the lever of a fire alarm box and then see the apparatus rush to the scene? Of course, common decency and respect for the right of others never permit us to sound such an alarm. But there is a feeling of excitement about the sounding of an alarm of fire. Let us visit the heart of the great New York City Fire Department Telegraph Bureau on the Island of Manhattan and see what takes place when a citizen sounds an alarm by "pulling" a fire alarm box.

It does not seem possible with the hundreds of thousands of automobiles, millions of people and congested narrow streets that *within less than two minutes after one has "pulled" a fire alarm box on the Island of Manhattan the apparatus is there!* Yet it is a fact and one of the things that the Mayor of the City of New York delights to show visitors.

When the lever of a fire alarm box is pulled down it sets in motion a clockwork mechanism that sounds the signal of that box four times. This signal is transmitted electrically to the Telegraph Bureau where it is received and recorded in four different ways.

A sounder somewhat the same as that used in the telegraph offices taps out the signal. At the same time a light on a board resembling the telephone switchboard exchanges flashes the signal. Another apparatus whirls and stutters over a long strip of paper tape and a punch perforates the tape with round holes marking out the signal. Another and wider paper tape runs under a pen and the signal is copied again in long and short dashes of ink.

The moment the alarm starts sounding and recording on the various systems the telegraph staff spring into orderly action. Let us follow the sounding of Fire Alarm Box number five hundred and one—501.

All is quiet in the Bureau when suddenly there is a tap from the sounder, a flash from the light, a buzzing from the perforating machine and the gears of the ink record whirl. Red lights flash with the smaller light on the board that resembles the telephone exchange board. An alarm is being sounded—Box 501.

A man seated before a tall desk that has cards filed

Using a roof rope—just before landing the body is thrust away from the wall by "kicking off" with the feet. This is to clear obstructions on the sidewalks or platforms. (Milton Photos)

Coming out of the "smoke cellar," at the Probationary School "fireman" Leyson was given a taste of what the men get fighting fire. Smoke is produced by chemicals. (Milton Photos)

for every alarm box in the district listens to the signal. Another checks it at the inking record. "Five" sounds out in rapid strokes and flashes and the man at the desk pulls out the drawer containing the five hundred cards. Next comes ten strokes and his fingers turn the cards to the 5—0 section. Then a final stroke. 5—0—1. He takes the card from the file. In front of him on that card is a record of all the apparatus that is to respond for the alarm and any subsequent alarms that may be sent in during the fire.

Another man is stationed at similar drawers in front of a complicated machine. He selects a metal card some five by eight inches in size. That is the card for Box 501. This metal card has innumerable round perforations in it, all set in straight lines. Its number is stamped in the upper right hand corner—501. He shows it to the man at the desk who is the despatcher controlling the sending of the apparatus much the same as a despatcher of a railway controls the movements of the trains.

The despatcher gives the metal card a quick and practiced glance, makes sure that it is the correct card. He nods his head and the other man steps to the machine and sets the card into a deep metal slot. Then he throws down a lever and swings an electrical

control. The signal immediately is transmitted to the proper engine and hook and ladder companies in their stations where it sounds out on a gong heard in any part of the fire house and repeated on the floors by other gongs. Seconds later the crew of the company are on the truck, the engines are roaring, the doors swing back and out they go. *On an average of less than fifty seconds from the time the citizen sounded the alarm at the fire box, the companies are in the street rushing to the fire!* The author timed some responses to the alarms in less than forty-five seconds from the first tap of the signal from the alarm box!

Now, let us pause for a moment and watch the working of the complicated machine into which the metal card was dropped. It is superhuman in its working and yet it is simplicity itself!

Above the slot where the metal card is dropped are hung dozens of long brass rods less than a pencil in diameter. When the operator pulls the lever these brass rods drop down against the card. Some of them pass through the perforations and do not touch the card. These "fingers," if we may call them that for convenience, are the ones that are *not* going to be used to transmit this particular signal for Box 501. The metal fingers that touch the card do the work.

We see five of them in a row touching and then there is a short section where fingers go through the metal card. Following this ten fingers rest down on the metal card and then another section where the fingers go through the holes clear of the card and then a solitary finger resting on the metal surface. Five, space, ten, space, one. 501 for 10 is the zero signal—the alarm box we are watching.

When the operator pulls the second lever he starts an electric motor that turns a segmented wheel with sections of brass insulated from one another somewhat like the commutator of a generator or an electric motor. (The shiny brass part where the two contacts rub on the part of the motor that revolves. It can be distinguished by the sections that are separated from each other by dark strips of insulation.)

The electric motor makes this round brass composite revolve and as it does the various sections come in contact with an electrical contact. Wires lead from the brass fingers to this contact. Now—here is the secret of the whole operation.

The fingers that touch the metal card are all carrying a current of electricity, for the card rests against a contact. The fingers that pass through the card without touching it are "dead"—they carry no current.

When the wires running from the fingers and ending at the contact carry current this electricity goes into the wheel, passes through the brass section and runs along the wires to the fire house to sound the bell and make the signal.

As the five fingers resting on the card have their wires carrying electricity, five sections will pass by the contact and each will send a separate current to the bell in the firehouse. It will clang five times. Then we saw that a few fingers passed through the card and did not touch it. As these are "dead" the next few sections of the wheel that pass the contact will not transmit current and the bell will not sound so that there is a space.

Then there are ten "live" sections to pass the rotating wheel sections and ten impulses will surge along the wires. Another space of dead sections and then a lone live one. 5—10—1 clangs the bell. 501, it signals!

Stripped to essentials this is the working of the relaying system. Actually it is far more complicated but to try to explain it is more the function of a textbook and has no place here. Let us be content with a simple way of showing how it works—just the fundamentals. Other fingers establish proper circuits, send calls to chiefs and register other pertinent data, but to go into

that is the part of a technician and we have little interest in it. Now, let us continue to follow through our mythical fire.

We have seen the first alarm come in from the box and seen it transmitted along to the proper fire companies for their action. The signal sounds in the telegraph bureau four times from the box and then it stops. But—in New York City, on the Island of Manhattan, fire alarm boxes are so placed that one is never more than a block from a fire box. Let us suppose that the fire is one that has burst through a roof and so can be seen for a distance.

Let us say that the fire is evident for an area of ten square blocks. Now, with the Manhattan system of locating fire alarms there will be at least ten boxes in the district where the fire shows. And it is safe to predict that at least five of those boxes if not all of them and more will be pulled if the fire is bright enough! What to do under those circumstances? Ten alarms or more all coming in within seconds! Where should the despatcher send the apparatus?

It is almost certain that the first box sounded will be the one nearest the fire. Now another mechanical wonder comes to our attention. The first box begins to send its call for help. Other boxes are started in

rapid succession as the citizens see the fire reflected so brightly in the sky. But the succeeding alarms do not come crowding in at the same time to make confusion in the headquarters of the telegraph bureau! Each box keeps working until the line is clear and then it transmits its signal!

Now, follow what happens in the Bureau. As the first alarm sounds, the operator at the machine in the Bureau glances at a map that shows the exact location of every alarm box in Manhattan. He usually knows the location the moment the alarm sounds, for these men are veterans. Immediately after this alarm is completed another sounds. It is the number of a box on the next corner to 501. Obviously for the same fire!

Others follow it and all show that they are in the immediate locality so they are not transmitted to the fire houses as the apparatus is already at the fire. But——

Suddenly a box sounds that is some few blocks away from the others. There is a space on the map showing that intermediate boxes are not sounded in the general excitement. Now what to do? Is it another fire or is it the result of the one we have been watching? It is up to the despatcher to decide. If it is spaced away from the others he will send a fire company to investigate, for he can take no chances of letting a fire go

unattended. In any event he will despatch orders to a chief's driver at the scene of the fire to drive over to the locality and investigate immediately.

Now, let us say that our fire is a bad one. Another alarm is sounded by the senior officer at the fire. He is calling for more apparatus. Another metal card goes into the slot and again the electrical impulses go to widely separated stations where the apparatus starts to reinforce those at the fire. In the same manner the third or following alarms are handled. A metal card dropped into the slot and all of the proper stations are called at once—apparatus, chiefs dash to answer the summons.

Now our situation is getting complicated. We have stripped the apparatus from the districts around the fire—the fire houses are empty. What will we do if another fire breaks out in the district covered by that apparatus? Let us watch the despatcher and see.

Above the board that flashes the separate light signals of the alarms and the board we thought resembled a telephone exchange board, is a map of the Island of Manhattan. Colored electric lights mark the location of all fire apparatus and companies on the Island. As the companies respond to the fire these lights are lit by the despatcher and he can tell at a glance what fire

houses have their companies absent. This will not do —the district must not be left unprotected from fire, for one fire will not wait for the return of the firemen from fighting another.

Placed strategically all over the Island are what are termed "Double Companies" where two units of each kind are housed in the same fire house. When a district has an alarm and the single company occupying the local station leaves, one of the "Double Companies" is automatically called by the telegraph as the alarm is sounded and this company dashes to the former company's station where it remains until the active company returns from fighting the fire. Thus the district is always protected.

Now let us assume that our mythical fire has assumed great proportions. It becomes necessary to sound a third alarm for more apparatus to check the rush of the flames. Our districts are stripped of apparatus, even the double companies are called. What are we to do now?

As this happens, the despatcher regards the situation and calls in companies from farther out in the city to cover the empty stations. If the alarm becomes general and a huge amount of apparatus is concentrated at the

fire we will see the apparatus from the suburbs moving in part to the downtown sections!

The suburbs are seldom the scene of seriously large fires; the buildings are not large, so apparatus can be shifted in to the center of town and still leave enough apparatus for safety in the outer sections of the city. Like a checker player, the despatcher moves his fire companies, concentrates the apparatus at the call of the chiefs at the fire and at the same time makes sure that no district of the city is left unprotected while the home companies are absent from their stations. Outsiders take their place and become that company until its return. The colored lights on the map show the distribution of the apparatus and let the despatcher tell at a glance how the situation is.

We might liken a large fire and its effects on the distribution of the apparatus to the dropping of a stone in the quiet face of a pond. The waves reach out, farther and farther, spreading to every section. So spreads the alarm of fire at a great conflagration. Wave after wave the calls for the outlying apparatus to come in to reinforce the apparatus concentrated at the fire or the districts in which the apparatus has been stripped, spreads through the city.

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Listen sometime, if you have the good fortune, to the alarm in a fire house. You will hear the bell sound its signal and see the men stop to listen. The stroke cease on the first number's completion. At once the men are either most attentive to the next signals or they lose interest. This is because there is a code for the different companies and this number sounds first.

Say that the bell in Engine Company 57, which happens to be the fireboat *Firefighter*, sounds. If the first signal is five they listen attentively, for five is code for engine companies and of course the *Firefighter* is one. Were the bell to sound six it would mean a hose wagon, seven a hook and ladder truck, eight a call for fuel at a fire to replenish the gasoline supply of the apparatus—not the fire! Nine calls a water tower, ten a rescue company, and eighteen brings the searchlight companies. So, if we want an engine company at our alarm of box 501 the bell in the engine company responding rings out five and then follows by the numbers five, zero, one. That orders the engine company to respond to the location of alarm box 501. Through the workings of the machine we watched, similar orders are transmitted to other companies—it may call a chief, a hook and ladder company, a

rescue squad, an engine company all at the same time yet sound each separate call in the company quarters wherever they are and identify each order by its code number for that company.

A JUNIOR FIRE PATROL–HOW YOU CAN HELP TO PROTECT NOT ONLY YOUR OWN HOME BUT THOSE OF OTHERS

CHAPTER XII

A JUNIOR FIRE PATROL—HOW YOU CAN HELP TO PROTECT NOT ONLY YOUR OWN HOME BUT THOSE OF OTHERS

We Combine the Experiences of the Different Divisions of the Fire Department into Practical Protection for Our Own Homes. We Follow the Course of a Mythical Fire in a Home and Learn Lessons from It—We Formulate Certain Fundamental Rules of Safety in the Home.

THERE is a great opportunity for the youth of America to help prevent the huge loss of money and property that we suffer each year through fires that are avoidable. It is a rare fire which could not have been avoided with proper precautions. Invariably they are the results of carelessness. And this last statement applies particularly to the home. Let us see what experienced firemen have to say about fire in the homes.

The most startling thing about fires in private residences is the high death rate involved. Like the fires, these deaths are mostly unnecessary and could easily be prevented by observance of simple precautions. It is not flame that usually causes them. Not flame directly but the results of flame—heat and gas.

How? Much in the same manner as the oven in your mother's range operates. Most of the ovens in

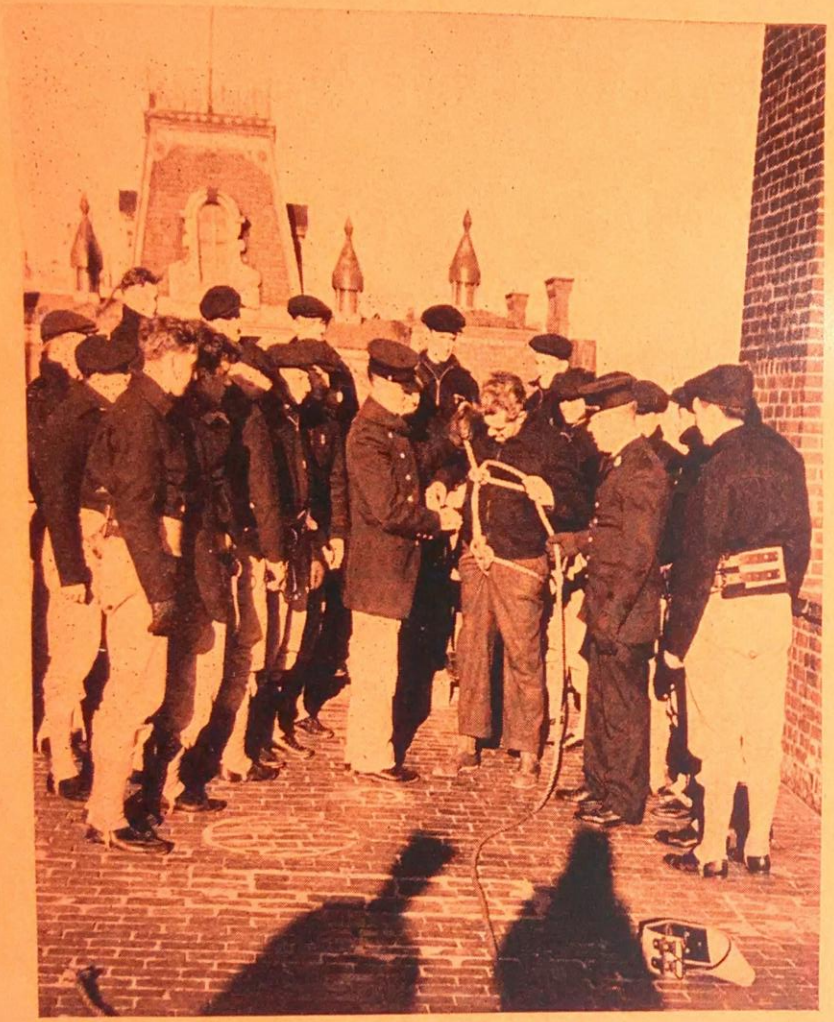
gas stoves have a broiler placed below them. Here the flame that heats the oven to baking and roasting temperatures is placed but it does not reach the food in the oven. Now, let us follow a mythical fire in the basement of a home.

It is night and all is quiet in the house. Everyone is in bed and sound asleep. But in the basement there is a dreaded visitor—fire! It has not entered the house of itself. It was brought in some time ago and in separate packages which alone were safe. But people in the house have brought them together and now they are dangerous—deadly so.

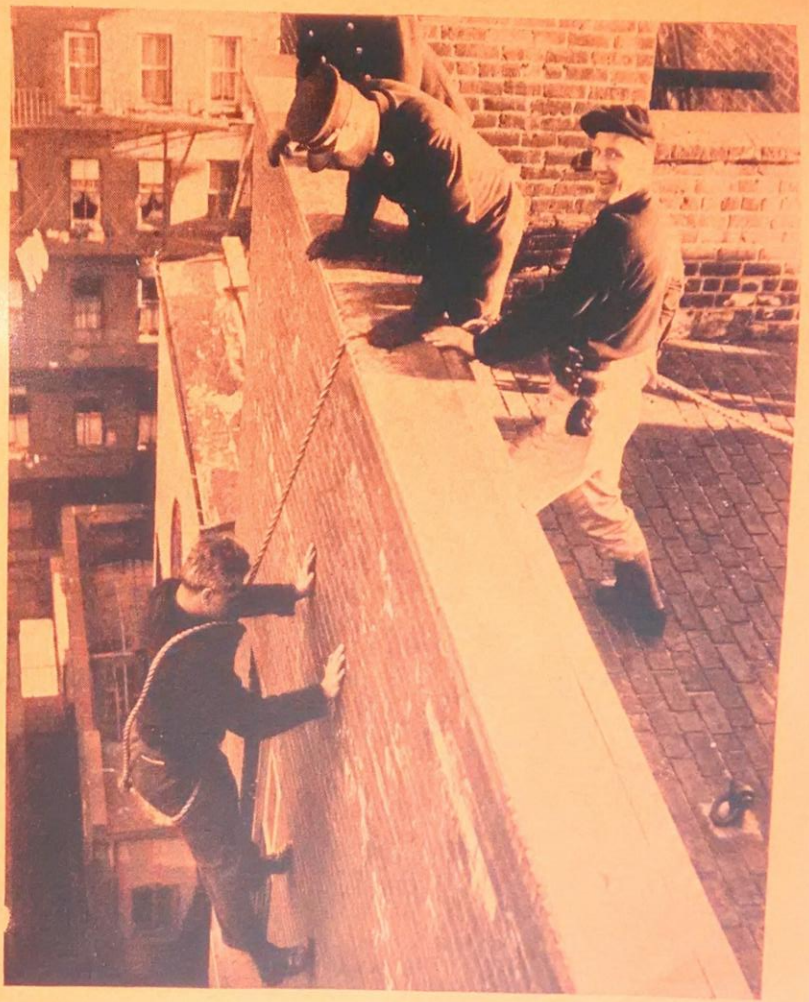
One of this dangerous combination is an old summer dress of mother's. It has passed its period of usefulness as a dress but the material is light and soft and mother has torn it into pieces for dust rags. It seems an innocent thing and it is—alone.

Another item that rests in that cellar closet by the stairway where the dust rags are, is a can of oily floor polish. It too is innocent alone. But, some of that polish is now saturating pieces of Mother's old dress that have been used to polish floors and furniture.

The closet door is closed and the air is warm. The saturated rags, lying in a corner, have been generating heat, getting hotter and hotter as the oil oxidizes.



An officer at the Probationary School checks the knots on the author before he descends the wall of the six-story building. (Milton Photos)



The author demonstrating the proper manner of descending the face of a building on a life line. (Milton Photos)

Hose is carried with the nozzle over right shoulder and beyond the small of the back. It passes across the front of the body and over the left hip. The rope around the waist is to secure the hose at the top of ladder. (Milton Photos)

Finally they become so hot that they char and smolder. A tiny flame starts and then the whole mass is on fire. Spontaneous combustion has resulted—they have fired themselves.

The fire is small at first but mops and dust rags, a broom, flimsy aprons and dry woodwork add to the volume and soon the closet is a nothing but a fiery mass. The door resists the flames but the heat makes the varnish on the outside bubble and smoke. Air seeps in under the door and escapes at the top, supplies a draft to add to the fury of the fire. The heat inside the closet is intense.

Finally the flames eat their way through the door. The woodwork of the closet is now deeply ignited and the fire catches on the stairway. It spreads, races across the cellar ceiling. Heat adds to its speed, for it causes the resin and volatile materials in the wood to distill out and add to the fire. Soon the entire cellar is in flame and the fire is licking at the door at the head of the stairs.

Confined for a time but thoroughly entrenched in the basement, it finally bursts through the door to the cellar and blossoms out into the ground floor of the house.

Intense heat rushes from the cellar and the burning

ground floor, rises upwards and fills the upper halls. The bedroom doors are closed. The heat builds up, hotter and hotter. The smoke is dense, and works its way under the doors and into the rooms. Finally it rouses the sleepers.

They awaken, their senses still drugged by sleep. Smoke! Fire! They spring from bed, dash for clothes and rush to the doors to escape the flames. They grasp the door knob and throw open the door. A heat that is blistering strikes them like the blow from a hammer. For an instant they stand motionless and then their knees sag. They make a vain attempt to retreat, to close the door on that terrible heat. But they sink to the floor and the heat and smoke pours into the room in a deadly volume.

The flames burst through the cellar windows and are ruddy in the lower floor windows. Neighbors awaken or a late passer-by sees the fire and sends in the alarm. Apparatus dashes to the scene and water pours into the house, strikes the fire, dampens its fury. Soon it is out, for the home is not large and the flames are readily overpowered by the great streams of water.

Firemen have raised ladders to the upper floor, broken into the windows and entered in spite of the flame and smoke. The water has cooled the tempera-

ture of the rooms, and openings have ventilated the smoke and heated gases. But the firemen dread to enter for they know well what they will find. Bodies lie on the floor, crumpled forms near the doorways.

Sorrowfully the firemen remove the bodies. They are not burned. Flame has not touched them, yet these people have died. How? It brings us back to your mother's oven.

The fire in the closet built up a great heat. This rose and soon the temperature of the closet was such that the wood and other combustible materials burst into flame. It had reached the "flash point," a heat at which the material burst into flame. Then the door had burned through and the flames rushed into the cellar.

There we had the same situation as in the closet, only on a far greater scale. When the flames burst into the ground floor the volume of heat was so great that it flooded the upper halls and soon made them as hot or even hotter than your mother's oven. Paint and varnish were bubbling with the heat, smoking and ready to burst into flame. No one could live in that terrifically hot atmosphere. Yet, when the smoke awakened the occupants they rushed to the doors and opened them, faced into that heat and gas.

Startled, they opened their mouths, gasped, drew the superheated air and gas into the delicate tissue of the lungs and burnt it to a crisp, sealed their fate with that one breath.

Had they known the danger they would have been saved. Under similar circumstances a fireman would have placed his hand against the door, felt it. If it were hot he never would have opened it. He would know that superheated gas and air waited there to strike him down. As long as the door held, and that would be for many minutes after the flames reached it, he would be safe, for he could go to a window and open it, get to air. And within minutes the firemen would be there to rescue him if he did not care for the comparatively low jump to the ground.

Such an example may sound far-fetched. But it may well occur if ordinary precautions are not taken. Such tragedies have happened as we have described. Carelessness and a lack of knowledge in fire prevention are the causes.

Prevention is simple. Never store oily rags in a closed space. Best of all, destroy them in the furnace. Again, never, in any place where you think that there is fire, open a door unless you have felt its surface and found it cool to the touch.

A JUNIOR FIRE PATROL

It is safe to say that there are few homes in which there is not an accumulation of litter which may be the source of a fire or spread fire if it starts somewhere in the house. A Junior Fire Patrol can do much in the interest of safety by looking around the house and seeing that such litters are cleared away. Also, we might add, he can help just as much by not making any!

Papers stored in the basement are another prolific source of fires. A spark, a smoldering cigarette butt and then a fire. Cigarettes are the cause of many fires in homes by being left burning in an ash tray. The tobacco burns away and the ash is light. The cigarette, laid on the edge of the tray with the lighted end over the bowl, loses its balance and falls to the floor where it continues to burn. Or it may fall onto the surface of a table, set fire to the covering and so begin the blaze.

Electrical appliances are blamed for many fires but often they are not the cause. Irons left on the ironing board while somebody goes to the store, various other appliances that might short-circuit and cause fire are often blamed. But in ninety-nine out of one hundred cases, a short circuit will melt the fuses of the house lighting system before any damage can be done..

Grease supplies many fires. Cooking over an open

flame with a pot of hot grease and then a small portion spilt, is usually the way in which the fire is started. It invariably is spread by the startled cook trying to carry the blazing grease to the sink and dropping it on the way. Turning off the gas flame and covering the pot as tightly as possible is the quickest way to stop it if there is not a fire extinguisher handy.

Speaking of fire extinguishers, it is surprising how few homes possess them. They are rarely needed but when they are they are invaluable and will save damage enough to pay for themselves many times over. Nor need they be considered "messy" now. The modern liquid carbon dioxide extinguisher will smother a fire in an instant and leave not the least trace of its use even on the finest and sheerest of fabrics. The liquid squirts under heavy pressure from the nozzle and when it strikes the air it loses the pressure that has made it stay in liquid form so that it becomes a heavy stream of gas. As anyone knows, carbon dioxide will not support combustion and this heavy gas blankets the fire from all the oxygen so that the fire is smothered at once. The gas readily dissipates into the air and there is not a trace left after a few minutes of thorough ventilation.

In connection with the use of fire extinguishers

there is one most important thing to remember and this same thing applies to the use of water to extinguish fire. It is this—CONCENTRATE THE EXTINGUISHER ON THE BASE OF THE FIRE, NEVER THE LEAPING FLAMES. Let us see why we should do this.

The fire is in the material below the flames. This material is burning and as it burns it gives off heated gases which are not completely burned at the source of the fire. These gases, still burning, leap upwards and form the flames. Directing the extinguisher—either chemical or water—at these burning gases that form the flame of the fire, will not stop their generation at their source in the material that is burning. So, we must check the combustion at its source, the base of the flames. The moment we stop it there the flames will disappear. The fire is under control and soon out.

Just as the Fire Departments have a Fire Patrol that exercises ceaseless vigilance in preventing accumulations of materials which constitute fire hazards, a boy in the home can act as a Junior Fire Patrol and see to it that no such hazards are present. It is time well spent. Suppose you try it.

THE HIGH-PRESSURE SYSTEM—WATER TO THE SKIES!

THE HIGH-PRESSURE SYSTEM—WATER TO THE SKIES!

We Watch a Fire on the Fortieth Floor of a New York Skyscraper and Wonder How Water is Forced So High—We Examine the High-Pressure System That Makes This Possible—We See the Splendid Planning for Safety That Goes Into Modern Fire-Fighting.

HIGH on the fortieth story of a great skyscraper towering on the tip of Manhattan Island a wisp of smoke swirls from the upper portion of an opened window. A moment later there is a heavy gush of black oily smoke and the ugly red tongue of fire. In the street far below is the terrorized cry of "Fire."

The building fire alarm is sounded and then another is sent to the Fire Department. Within that incredible two minutes fire apparatus is drawn up in front of the building and more apparatus roars and wails its way farther up the streets. The deep canyons echo and re-echo to the shrill blasts of siren and bell.

A large crowd quickly gathers, blocks the sidewalk, and flows into the street to impede traffic. From a near-by police station reserves rush to the scene to hold back the rapidly growing mass of humanity. All

eyes are aloft where ominous clouds of smoke pour from the windows. The building elevators are packed with fleeing employees; the fireproof stairways tremble under thousands of feet, for one of these great New York skyscrapers houses over forty to fifty thousand people employed in the maze of offices.

A man in the crowd looks up at the cliff-like face of the building, measures it with his eye, calculates the great height.

"They'll have a time getting water up that far!" he exclaims. "Why, a hose won't squirt a tenth of that distance!"

He ponders on the situation. He knows that there must be a way of getting water to such a height but how is it done? He hasn't long to wait for his answer.

The engine companies that have answered to the alarm ignore the usual hydrants as though they did not exist. Instead they draw up at huge hydrants on the other side of the street. These hydrants have four outlets instead of the usual two.

Now the bystander notes another thing. The Pumpers have drawn up at a smaller hydrant while the hose wagons have connected their lines to the large hydrants. These lines are led to the openings of the standpipes in the building. The Pumpers merely stand

by the smaller hydrants, connected but their pumps idle. They are not needed and the reason lies many blocks away. As a matter of fact there are two reasons why the Pumpers are not needed at this particular time.

Far over on the West Side near the edge of the Hudson River in the Gansevoort Market district, four thousand eight hundred horsepower have sprung into action at the touch of a switch. Six great pumps are hungrily sucking water from a thirty-six-inch water main that connects directly with a huge reservoir in Central Park. Another great water main—thirty inches in diameter—connects the pumps with the Catskill Aqueduct. So the pumps can draw upon millions and millions of gallons of water and there is never a possibility of exhausting their supply.

The pumps hurl the water into other mains, send it surging through their lengths until it thrusts with a pressure of one hundred and twenty-five pounds to the square inch through every part of the system.

And this system we speak about is a separate unit of the waterworks of the city. New York has the distinction of pioneering elaborate high-pressure water systems for fighting fire. New York's was a special problem—the problem of getting water under pres-

sure to great heights in the skyscrapers of Manhattan. And that water supply could not depend solely upon the pumps and standpipe system of the buildings. Let us make a trip of inspection and see how this network of pipes is laid and how the water is delivered to the hydrants for use by the firemen.

We have seen that there is one great pumping station located in the lower part of Manhattan on the West Side near the Hudson River. This station covers the entire high-pressure zone of the lower part of Manhattan. Roughly, the zone runs from Canal Street south to the Battery.

Located on the East Side of the Island is another station so that the pressure can be maintained even if the Gansevoort pumping station should suffer a partial breakdown. This second station is near Oliver Street on the waterfront and known as the South Street Station.

It might seem possible for the entire system to break down as a result of a broken main somewhere, but it isn't possible. The system is divided into zones and each of these zones can be cut off from the rest of the mains by valves so that if a break does occur the whole system will not be put out of action.

Each one of the pumping systems can deliver

twenty-four thousand gallons of water a minute under a pressure of three hundred pounds to the square inch. And should the water supply break down in spite of the double source of water there is still another supply to drawn on. The pumping stations are connected by thirty-six-inch mains to the rivers where they can draw salt water in unlimited quantities. Of course this would be done only in emergency, for the resulting water damage from salt water is far heavier than sweet water and the Fire Department is very careful to use a minimum of water at fires. A record is kept of the number of gallons used.

When the fire in the fortieth floor was first reported the pumps in the Gansevoort station started at once, for the alarm was despatched there from the Telegraph Bureau. The normal water pressure of forty pounds to the square inch instantly begins to mount until it reaches one hundred and twenty-five pounds. There it is held.

Now, let us suppose that the pressure is not sufficient when the firemen get to the fortieth floor. They want a greater volume of water. A chief orders his assistant to notify the station. Immediately the pressure is increased to any amount he wants up to the maximum of three hundred pounds to the square inch.

Should the fire be quickly brought under control the pumping station is informed and the pressure is dropped so that the strain on the pumps and the system of mains is as little as possible.

The great new Pumpers of the Department form a third reserve in emergencies for this high-pressure system. These new engines can deliver water at a pressure of three hundred and twenty-five pounds to the square inch and as the engines are standing beside the ordinary low-pressure hydrants all that is necessary is to start them pumping and connect with the standpipes should the two high-pressure systems fail. But such a possibility is more than remote. Nor have the pumping stations ever been called upon to use all of their power. Usually three of the six pumps will more than take care of any demands for water at a fire.

When one considers that each station is equipped with six pumps and that the stations feed into common mains, it is easily seen that no fire could demand more than they could supply of high-pressure water. Together the two stations can force forty-eight thousand gallons of water a minute under three hundred pounds pressure through the mains!

Aerial ladders in position at a fire to clear the premises of persons trapped
(Courtesy of Fire College, N.Y.F.D.)

Firemen annually repair toys for distribution to poor children. *(Courtesy of Fire College, N.Y.F.D.)*

THE AUXILIARY FIREMEN

THE AUXILIARY FIREMEN

The Necessity of Auxiliary Forces—the Limitations of the Regular Fire Departments—a Hypothetical But Entirely Possible Situation if Air Attack Comes. The Essential Role of the Auxiliary—the Plan of Distribution of These Forces—Their Work.

No FIRE department in the world is faced with a more complex problem of fire prevention and fighting than that of the New York City Fire Department. Whole sections of the city are covered by lofty skyscrapers where twenty, thirty and more stories are the rule rather than the exception. Yet within the distance of but one or two blocks adjoining districts are solidly built up of old type tenement buildings, inhabited by hundreds of thousands of people. From the modern fireproof buildings it is but a step to districts of high life hazard, districts where the older brick and wood construction offers every chance for a quick and disastrous fire. That there are no such conflagrations is to the everlasting credit of the New York City Fire Department.

Due to the rapid growth of American cities this condition is not alone common to New York. It ap-

plies generally. It is germane then to look closely into this condition and consider it from the standpoint of what might possibly happen in the event of an air raid by enemy planes.

The normal fire department has the personnel and the apparatus to handle any ordinary fire. Arrangements are made in advance for the reinforcement of the departments in the case of a great conflagration. The adjoining cities and towns have a very efficient and closely coordinated system of mutual assistance covering these emergencies. Furthermore, the system has stood the test of actual experience and proven its worth.

It is customary for the chiefs of a department to carefully consider the fire hazards which the property in the city presents and then make a request for sufficient apparatus to cover any emergency which might arise. This includes several severe fires at the same time.

But let us consider the effects of an enemy air raid where large quantities of explosive and incendiary bombs are dropped on the city. It is a foregone conclusion, amply proved by experience in London and elsewhere, that fires which are beyond the scope of the local department will be engendered. There is but one

answer to such a situation. An additional force, an auxiliary fire fighting group, must be in existence to meet such an emergency. It is for that reason that the cities of our coastal areas in particular have organized and trained such bodies of men. That they may never be called upon to serve in such a capacity is probable and we all hope that it is certain. But the risk of such an emergency cannot be taken without due protection.

That aircraft are in existence which are quite capable of making the flight from enemy territory to the continental United States is a matter of fact. That these same military types could carry a sufficient bomb load to create any extensive damage to our war industry is another matter. Fortunately our war industry is chiefly housed in modern buildings which are not easily fired and have ample protection internally to take care of the ordinary incendiary. A combination of explosive and incendiary bombs is another thing entirely.

But the coastal cities and their facilities for docking and loading ships are not so well defended against fire. It is not necessary for these installations to be bombed with explosives although from the military viewpoint such is better. Fire on a large scale will work untold havoc with docks and wharfage.

The ordinary incendiary bomb weighs on the average some four pounds maximum and is quite capable of starting a very serious fire if it is not quenched at once after its fall. For a modern bomber, granting that the majority of its load capacity is given to gasoline for a long flight, a ton of weight is not any great cargo. Yet a solitary ton of cargo in incendiaries means that the bomber will be able to drop some 500 or more bombs.

Dropped over a wide area, these 500 incendiaries present a most serious problem. That not over forty percent of them and most likely nearer but 20 percent will strike and fire a building is a safe average. Yet even at the lower figure of 20 percent this means that the one bomber is able to start 100 fires.

Data from London shows that if these fires are promptly attended to they will not spread and can be quickly extinguished. But to do so calls for a large and well trained personnel. It is here that the Auxiliary Firemen come into action.

Air Raid Wardens are not a fire fighting organization. Primarily their task is to make certain that the populace remain sheltered and to report all fires and such incidents to proper authorities. They cannot be expected to do this while busily engaged in fighting

fire. London found it necessary to install roof watchers, persons stationed on the roofs of buildings to guard against enemy incendiary bombs falling and setting fires which might not be immediately observed.

Thus it is evident that if one bomber can start, within reason, 100 fires which require immediate attention in order that they do not become major incidents, the auxiliary force must be of great size to cope with massed raids.

Assistant Chief of Department, in Command, John J. McCarthy of the New York City Fire Department estimates that a city of the size he represents needs an absolute minimum of 60,000 such auxiliaries to combat any emergency which may arise from enemy air attacks.

Chief McCarthy should know well what is required. Under his direction the working force of auxiliaries has been built up. He has thoroughly studied the problem with Commissioner and Chief Patrick J. Walsh and been responsible for carrying out the plans the veteran fire fighter approved. Commissioner Walsh is a widely recognized authority on fire fighting and his position as Commissioner and Chief of the New York Fire Department bears out his abilities.

The plan developed by these experts is to station

companies of auxiliaries in various parts of the city where they can be called into action to aid the regular department. The auxiliary companies are equipped with their own apparatus as fast as is possible under the present conditions and go through a rigorous course of training so that they are efficient. Naturally they are not to be compared with the professional fire fighter nor would it be fair to do so. These men are public spirited citizens who have given freely of their time and endured a very considerable physical hardship in their training. They are not paid. Their worth has been well established already in several large fires where they aided the regulars.

Their detailed duties and training are set forth in a manual written by Chief McCarthy and approved by both the Mayor of New York and Commissioner Walsh under the title of *Fire Fighting, A Practical Guide for Firemen and Auxiliaries.* It is published by the Femack Company of 19th Street, New York, sells for $1.00 postpaid. The book is one which any person, whether an auxiliary or regular fireman, should read.

FIRE BY AIR ATTACK

FIRE BY AIR ATTACK

Fire—One of Air Attack's Chief Weapons—the Methods of Employing Fire—the Incendiary Bomb—Its Construction—Effects—Explosive Bombs—Their Construction—Effects.

FIRE IS one of the chief weapons of air attack and it is engendered by two means. The most important is the incendiary bomb, a bomb designed specially to ignite as its name implies. The other creates fire as a secondary effect. This is the explosive bomb. Its prime mission is the demolition of structures and the resulting fire from its blast or the damage created to these installations it strikes merely adds to its effects. It must be considered however in fighting fires resulting from enemy air attack for it not only creates them but presents a great hazard to fire fighters through its explosive effects.

The incendiary bomb is used in several different types. Commonest is the so-called electron bomb. This bomb is made of an alloy of magnesium, a light, white-colored metal which burns readily in air at a high temperature. The metal is ignited by a priming charge of thermite. Thermite is nothing but a mixture of aluminum in a finely powdered form, and iron oxide.

This mixture of metals is widely used for certain forms of welding. Ignited, it burns with great intensity. The aluminum combines with the oxygen of the iron oxide and metallic iron is left in a molten state. By placing a charge of this powder around the parts to be welded and then igniting it the material is brought to a high temperature with the firing of the charge and then the molten iron flows into the space between the material and solidifies into a permanent weld. In the bomb advantage is taken of the extreme heat generated by the combustion to ignite the magnesium alloy forming the case of the incendiary.

The bomb is usually made in a weight of about two pounds, is some 14 inches in length and 2 in diameter. One end is fitted with metal vanes which hold it to a straight course in falling. The other end is blunt and fitted with a fuse. Upon impact this fuse ignites the charge of thermite and fires the bomb.

Dropped from a great height, these bombs do not attain the velocity that might be imagined. This is due to their blunt nose as well as the fact that they are light. They attain a speed of some 400 feet a second and have an impact of some 5000 foot-pounds.

(The kinetic energy of a bomb may be determined by the formula: weight of the bomb times the square

of its velocity divided by twice its acceleration in feet per second due to gravity.)

Thus, from the above formula, the 2 pound incendiary bomb, falling at the rate of 400 feet a second, achieves an impact striking force of 5000 foot-pounds.

$$\frac{2 \times 400 \text{ squared}}{2 \times 32. \text{ (gravity acceleration)}}$$

As these bombs are not of a streamlined form their flight is erratic and they cannot be dropped with any great degree of accuracy. The usual manner of dropping them is in clusters. The bombs disperse over a wide area through their own erratic flight. Another system is to drop them in containers, termed "Molotoff Baskets" after the Russian inventor who designed this container for use against the Finns at the time Russia attacked that nation.

The container carries the incendiaries in compartments and is released from the bomber in the usual manner. But in falling fins which are set at an angle cause the container to rotate rapidly. After a fall and the speed of rotation is sufficient the container is opened by a small charge of explosive. The centrifugal force of its rapid rotation hurls the incendiaries over a

wide area and makes their spread much wider than would be the case if their ordinary dispersal was depended upon.

Discounting the disadvantage of the inability of the electron type to hold an accurate course is the fact that it works its havoc almost silently. Being small in size, it does not create the usual loud howl of the explosive bomb and the noise of its impact is but a sharp thud. Upon being ignited there is no noticeable explosion from any distance. This tends to make the bomb far more efficient for in the noise of an air raid, amidst the crash of high explosive bombs and the roaring of the anti-aircraft defense, striking incendiaries are often unnoticed. This gives them a chance to start fires which gain serious headway before they are detected.

The usual procedure in dealing with the incendiary is to approach it under cover or behind some solid substance and then to direct a solid stream of water on it. This causes it to burn rapidly and it soon is extinguished. The stream will readily take care of any fire it starts in the immediate area where it burns.

To counteract this method of quenching incendiaries the Germans have developed a new type. This bomb carries a small but effective explosive charge as

well as the ordinary incendiary material. After the bomb has struck and ignited a delayed action fuse causes it to explode and hurl burning fragments all over the immediate area. These fragments are thrown with sufficient force as to be highly dangerous. Attempts to quench such bombs at close range without adequate protection means that the auxiliary is certain to be either killed or badly injured. Consequently the protection of a shield of some material is necessary.

A second type of incendiary is the oil bomb. This type is far larger than the electron and in it such bombs attain the maximum size. Oil bombs usually are cylindrical in shape and pointed at the ends. One end carries the familiar fins for directing its flight in a straight path and the other end carries a fuse. In some cases fuses are set in both ends to make certain that the bombs explode on contact.

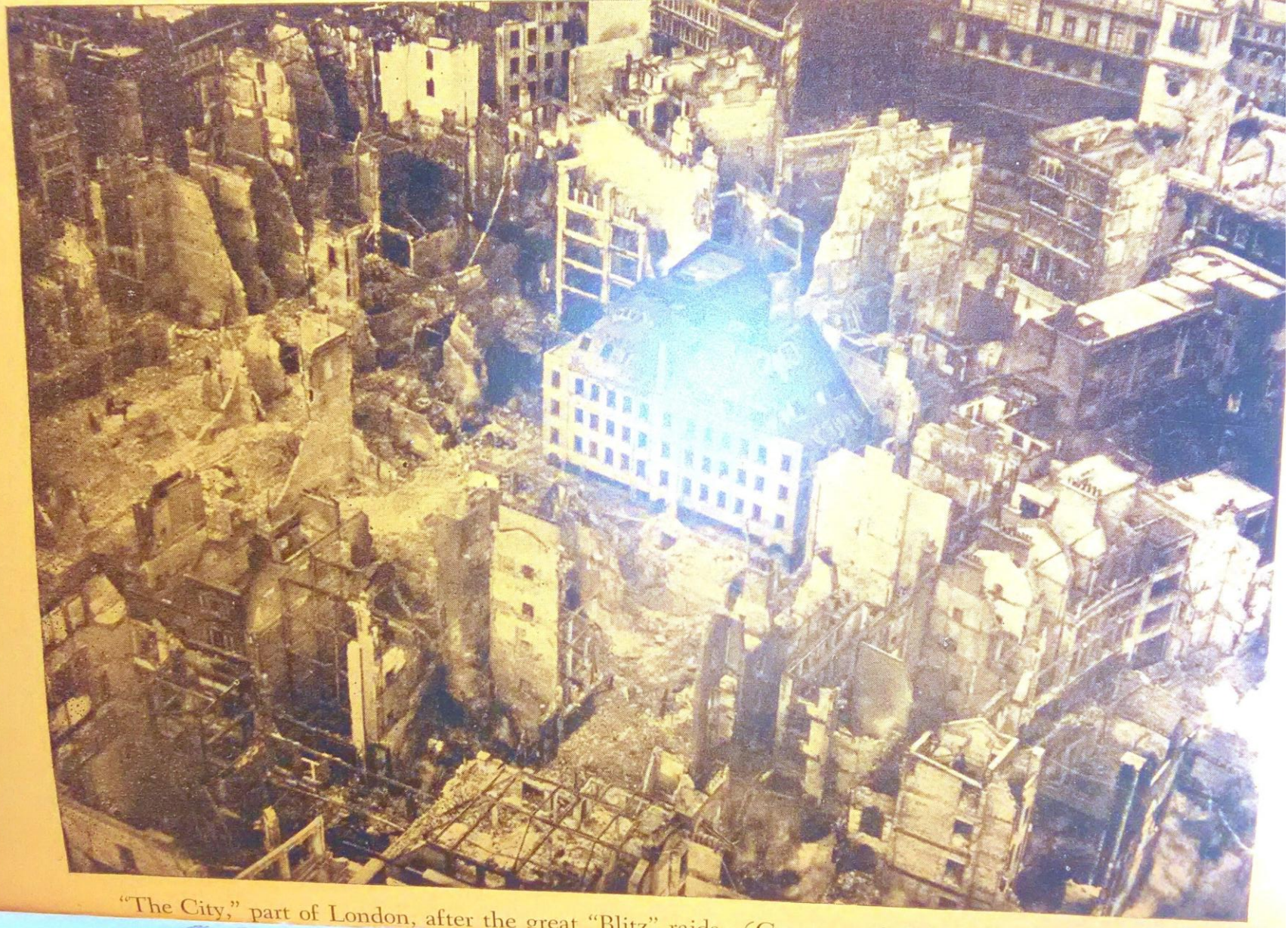
The interior of the bomb is composed of two chambers. The inner chamber carries a charge of high explosive which is sufficient to shatter the outer casing and scatter it over a very considerable distance. This makes the bomb a very dangerous missile for those who happen to be near where it falls. In the space between the interior chamber and the outer casing is a quantity of oil such as is ordinarily drained from the

crankcases of engines. Such oil, diluted by the combustion products of the engine, is highly inflammable. The charge in the interior of the bomb ignites it and scatters it far and wide over the surroundings.

Oil bombs are far more difficult to deal with than the electron. Too great a supply of water on the fire will carry the oil, still flaming, and spread the fire. Sprays of chemicals, such as Foamite, are the most effective means of combating them. There is also present the added difficulty of clouds of dense black smoke which hamper vision and cause throat irritation. Masks are often necessary where these bombs have fallen. Bomb for bomb, they are the most to be feared of the incendiaries.

The third type of incendiary is filled with phosphorus. This element, when exposed to air, burns furiously and decomposes into oxides which form heavy and spectacular clouds of white smoke. It is a very effective firing agent and carries the additional threat of serious and dangerous burns from its flying particles. Phosphorus is very difficult to remove and even after a thorough wetting down to quench the flames is prone to kindle again the moment that the dampness departs. It is not however in general use, other types being more efficient even if less spectacular.

Firemen overhauling the remains of a fire to make sure it does not rekindle. (Courtesy of Fire College, N.Y.F.D.)



"The City," part of London, after the great "Blitz" raids. (Courtesy of Fire Co[illegible]

THE HIGH EXPLOSIVE BOMB

The high explosive bomb is the chief weapon of the air raider. This weapon is augmented by the incendiary bomb in some of its forms. As yet the raiders have not attempted to use war gases but there is no reason to believe that they will not be used if it is thought they would be effective. Fortunately gas attack by air is not considered economical from the strictly military viewpoint.

If a person is going to defend himself and his family intelligently as well as help others it is imperative that he have a knowledge of the weapons which are to be used against him. Such a knowledge does much to eliminate any fear or uncertainty. If one knows the power and the limitations of the high explosive bomb it is possible calmly and coolly to set about taking precautions against its effects.

The high explosive bomb is a roughly streamlined metal container having metal vanes set at one end to direct its fall in a straight path. The interior of the container holds a charge of high explosive and a means of detonating it, either instantaneously or at a set interval after its contact with the objective. The part holding

the explosive charge is usually referred to as the case or casing.

The bomb is released from the airplane and falls with the same forward direction as that of the plane at the moment of release. It does not fall in a straight line vertically but assumes a long curved path forward, a slightly altered parabola due to the effect of the resistance of the air to the fall of the bomb. This path is referred to as the trajectory. Later we shall see that this is an important consideration in figuring the effects of these bombs.

The destructive force of the bomb depends upon two factors, one important and the other of much less importance yet not sufficiently less to be eliminated from safety calculations. The chief factor of destruction is, of course, the high explosive carried in the casing of the bomb. The lesser factor is the force with which a bomb strikes the objective. This can be astoundingly large.

Let us first direct our attention to the action of the high explosive. Technically an explosive is an unstable substance which, under stimulus, is converted into a very large volume of stable substances (gases etc.) in a very short interval of time. The rate at which this conversion takes place determines whether the explosive is

a low or high explosive. The higher the rate of conversion the higher the explosive is considered to be.

The low explosives are represented by ordinary powders such as are used in shot gun shells and fireworks. Their rate of conversion is not rapid in the sense of an explosive.

The high explosives change into gases with lightning speed. The rate of the conversion is anything from 15,000 feet to 25,000 feet a *second*.

To illustrate this tremendous speed consider the approximately 225 pounds of high explosive which is carried in the casing of a medium 500 pound bomb. This explosive changes completely into a gas in about 1/10,000th of a second.

One cubic foot of the average high explosive, when detonated, changes from solid form into about 1000 cubic feet of gas. This gas is at a very high temperature and this causes a further expansion of the volume, estimated at from ten to twelve times the original.

Thus we see that within 1/10,000th of a second every cubic foot of solid explosive in the 500 pound medium bomb is changed into from 10,000 to 12,000 cubic feet of gas.

As this gas is confined within the metal walls of the bomb casing a tremendous pressure results. The bomb

casing swells to some one and one-half its normal size and then bursts into fragments.

The pent-up gases force their way past the fragments at an estimated rate of 7,000 feet a second. This great potential volume of gas at atmospheric pressure, rushing out and expanding as its pressure is equalized to that of the atmosphere, causes an intense compression in the surrounding air. This compression is so intense and is accomplished in such a brief period of time that it results in a shock wave, a wave of force that travels in all directions from the exploding bomb.

At the same time there is a smaller area around the explosion where an intense blast is generated. This is the area in which the gases expand after bursting the bomb casing. This limited area, in the case of the 500 pound bomb some thirty to forty feet, is known as the zone of expansion. The forces generated in this zone are immense but very limited in their range. However, it is this expansion that sets up the shock or blast wave. The blast wave has a far greater zone of effect.

The shock wave may be compared to an ordinary sound wave except that it has a far greater amplitude and velocity. As the distance from the point of explosion increases the shock wave gradually loses its force.

Yet, as we have seen, it still has sufficient force to shatter windows and even some walls at two hundred feet. Eventually the shock wave is reduced in velocity to the rate of ordinary sound, approximately 1000 feet a second.

Let us examine this shock wave in more detail. Experiments with a 500 pound medium bomb (the type most generally used is the medium weight casing) show that the shock wave from the explosion develops a pressure of slightly over six pounds to the square inch at a distance of fifty feet. This pressure, assuming that the ordinary person is 5½ feet tall and an average of 1¾ feet wide, amounts to 8,316 pounds. It is applied and lasts less than 5/1000 of a second. The shock is such that its effect is practically certain to be fatal.

These same experiments showed that at 30 feet the shock wave exerted a pressure of 24 pounds to the square inch. At 100 feet the force was 2.3 pounds to the square inch and at 200 feet it had dropped to 0.4 pounds to the square inch. Even at 200 feet the total pressure brought to bear on our mythical person would amount to 557.4 pounds.

From these pressures, exerted with great speed so as to be really what amounts to a blow of the same force,

it is readily seen that the shock wave is capable of shattering glass at 200 feet and driving it forward with sufficient force to cause serious injury.

NO BETTER EVIDENCE IS NEEDED FOR THE NECESSITY OF PROPER PROTECTION AS SET FORTH IN THE CHAPTER ON WINDOW PROTECTION. IF ONE DESIRES FURTHER EVIDENCE ALL THAT IS NECESSARY IS TO CONSULT THE LONG CASUALTY LISTS OF SPLINTER VICTIMS IN LONDON.

During the blitz raids in London it was noticed that windows and even walls often were broken and the debris drawn in *towards* the point of explosion. Air raid wardens who had been exposed closely to bomb explosions reported that there was the shock of the blast wave and then the breath seemed to be drawn out of their lungs.

This so-called "suction" caused considerable comment and some apprehension. The explanation is simple and as it bears on the protection of windows is of interest.

The shock wave of the explosion, a wave of force, of compression, is followed by its negative component, which exerts its action in the opposite direction. (New-

ton's third law—in effect, all forces have an equal force exerted in the opposite direction.) As the shock wave is compressive, the opposite force to it must be a wave of rarefaction.

The total length of time that the shock wave exerts its pressure to any extent is less than five milliseconds, 5/1000 of a second. Under proper circumstances, this shock, striking a window, shatters the glass.

But the shock wave passes before the glass is completely crumbled. The following wave of rarefaction, a "suction," then follows and the fragments are drawn towards the point of explosion. It is this same wave of rarefaction which caused the "breath to be drawn from the lungs" reports of persons in the immediate vicinity of a bomb explosion.

This "suction" following the shock wave of the explosion has been carefully measured in experiments with a 500 pound bomb and was found to be 1.4 pounds to the square inch of negative pressure at 50 feet from the explosion, 0.8 pounds to the square inch at 100 feet and 0.2 pounds to the square inch at 200 feet.

Now let us again go back to the time of the explosion of the bomb. We observed that the casing expanded some one and one-half times before it burst

into fragments. Then the gases rushed out at the tremendous speed of 7000 feet a second. The first rush of the gases passes the fragments of the casing. But within about 1/5000 of a second the impact of the explosion, the expanding gases, imparts to the fragments a velocity equal to the speed of the gases.

From this it is seen that the fragments, having such a velocity, some 5000 feet a second at times, are a serious menace. A small fragment weighing but one-half of an ounce, moving at a comparatively slow speed of but 2000 feet a second, penetrated 5.05 inches of firm Douglas fir during experiments. Likewise, a fragment weighing but one-fiftieth of an ounce with a velocity of 4000 feet a second penetrated the fir to a depth of 3.55 inches.

The range of these fragments varies greatly. If the bomb penetrates the earth to any extent the range is very short and the fragments few as the majority are trapped in the earth where they expend their force.

A bomb bursting either on the surface or but a few inches into the surface scatters fragments over an area up to twelve hundred yards. The effective range, where the fragments are of such velocity as to be highly dangerous, is some five hundred feet. In the case where the bomb explodes in a building the fragments are

limited in range by the walls and effective only locally.

From the foregoing it will be seen that there is ample reason to surround the table shelter suggested in the chapter on Safety in the Home with ample protection such as mattresses and heavily upholstered chairs.

A bomb bursting nearby is quite capable of hurling fragments through the average wooden wall of a house. By your being on the floor as suggested, fragments entering windows will pass overhead and not cause injury to those present.

The English have established standard thicknesses of various materials which will afford adequate protection against bomb fragments.

Material	*Thickness*
Mild steel plate	1½ inches
Solid brickwork or masonry	13½ "
Reinforced concrete	12 "
Ordinary concrete	15 "
Earth or sand, minimum	30 "
Ballast or broken stone, minimum	24 "

(The concrete must be of the best quality; the earth, sand or broken stone contained in casings such as described in the chapter on Window Protection.)

Now let us consider a third result of the explosion of the bomb. If it strikes in the earth, penetrates and then explodes, it sets up an earth wave. This earth wave can be compared to the same vibration caused by an earthquake. It is a shock wave transmitted through the earth by the explosion.

This earth wave acts on the foundations of structures. Where they are some distance from the point of explosion and the foundation is well constructed the effects are usually absorbed and no damage results.

However, walls which have been weakened are often brought down by the vibration or failure of the foundations due to the earth wave.

A fourth effect of the bomb is not its explosion but the force with which it strikes. This force can cause great damage even if the bomb does not explode.

The average medium case 500 pound bomb, falling at a rate of 800 feet per second, which is a comparatively slow rate of fall for a bomb, strikes a blow of 5,000,000 foot-pounds!

The effect of this impact upon structures and bomb shelters is severe. Also, the shock of impact, transmitted through the solid material of the shelter, can have a serious effect upon the occupants.

To give an adequate idea of the force of a falling

bomb, discounting its explosive force entirely, bombs of very light weight, 110 pounds, will penetrate various substances as follows:

	Depth of Penetration without exploding	
Material	*feet*	*inches*
Earth	13	9
Clay with small stones	11	6
Sandy soil	8	7
Firm gravel	5	7
Brickwork or soft rock	4	7
Hard limestone	1	4
Mass concrete	2	0
Reinforced concrete	1	4

(Above figures are from various European military authorities.)

Let us briefly review what happens when the high explosive bomb strikes and bursts.

The explosive changes to gas in approximately 1/10,000 of a second.

An internal pressure estimated as high as 650 *tons* (1,300,000 pounds) to the square inch is developed.

The bomb casing expands approximately to 1½ times its original size.

It bursts into fragments, releases 10,000 to 12,000 cubic feet of gas under the immense pressure stated above for every cubic foot of explosive present.

The gas bursts out at some 7,000 feet a second.

Within 5/1000ths of a second the fragments attain a speed of approximately 5,000 to 7,000 feet a second.

The expanding gases exert a terrific pressure on everything around for about a 35 foot radius.

A shock wave travels through the air, breaking and rupturing structures around the explosion. Windows up to a distance of some 200 feet are broken.

A wave of rarefaction follows this wave, drawing debris in towards the point of explosion.

The fragments have an effective range of 500 feet and some travel as far as 1,200 yards.

The explosion causes an earth wave which may or may not cause foundations and walls to collapse.

The bomb strikes with great force, imparting an impact of 5,000,000 foot-pounds in the case of the 500 pound bomb striking at the comparatively slow speed of 800 feet to the second.

This impact is sufficient to cause heavy damage

without the bomb's exploding. It has a great shattering effect.

From the foregoing it is readily realized that a high explosive bomb is not something to be treated casually. It is a deadly instrument but not one against which adequate measures of protection cannot be taken.

So far we have dealt with the explosion of the bomb and its effects. It may be of interest to classify the bombs. High explosive bombs are divided into four main types according to the thickness of their casing.

Where reinforced structures, such as military fortifications and so forth, are to be attacked, a heavy case bomb is used. This has a very heavy casing to withstand the impact against armor etc. and carries a much smaller explosive charge.

Medium case

The medium case bombs are used against buildings and other such objectives. This is the most commonly used type in air raids and the one with which the citizen will have the greatest acquaintance.

Light case

The light case bomb is used more for fragmentation and against ground personnel. It is also used against

submarines and for a given bomb weight it contains a greater amount of explosive. The water has not the shattering effect on the casing that ground objects have.

Fragmentation

These bombs rarely are over fifty pounds in weight and are in reality little more than enlarged hand grenades for use against troops.

Time bombs

The time bomb is simply an ordinary high explosive bomb fitted with an extreme delayed action fuse to explode it hours or days after its fall. The fuse is usually in the form of a metal container holding acid. The thickness of the walls of the container determines the time of the explosion which will occur when the acid eats its way through the walls and meets with chemicals to cause detonation. This bomb is effective in closing off areas and disrupting normal traffic and business.

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Authentic and Comprehensive."

—INTRODUCTION BY THE HONORABLE JOHN J. McELLIGOTT, CHIEF OF THE UNIFORMED FORCES AND COMMISSIONER, FIRE DEPARTMENT, CITY OF NEW YORK (1934-1941).

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(Signed)

J. J. McElligott

(March 1939)

[*Picture on jacket courtesy of New York Fire College.*]